THERE IS NO SUCH THING AS A FREE RUN

AN EXAMINATION OF THE DETERMINING FACTORS OF SPORTS EXPENDITURE

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Doctoral Thesis
in Kinesiology

Jury:

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Chairman:	Prof. Dr. Bart Vanreusel
Commission members:	Prof. Dr. Stefan Késenne
	Prof. Dr. Wim Lagae
	Prof. Dr. Daam Van Reeth
External jury member:	Prof. Dr. Paul Downward

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'The long run is a misleading guide to current affairs. In the long run we are all dead. Economists set themselves too easy, too useless a task, if in tempestuous seasons they can only tell us, that when the storm is long past, the ocean is flat again.'

John Maynard Keynes

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Dankwoord | Acknowledgements

Het voorliggende manuscript is het deugddoende resultaat van een bij momenten zeer intense rit. Tijdens het schrijven heb ik altijd veel steun genoten op mijn werk, bij familie en bij vrienden. Graag zou ik hen hiervoor uitgebreid willen bedanken. Mocht ik dit in het verleden te weinig gedaan hebben, verwijs ik naar een zekere genetische voorbestemdheid. Om het met de woorden van een groottante te zeggen: 'Gie kent da wel eh, nen Thibaut dat klapt ni!'.

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English Summary

The current doctoral thesis focusses on the determining factors of sports participants' expenditure. From an economic point of view this is an important research subject, as the sports industry directly contributes to Western economic welfare and accounts for an increasing share of total employment and GDP. This is not surprising, as figures indicate that 64.3% of the Flemish population practices sports at least once a year. The majority of this large number of sports participants spends money on sports goods and services, certainly when they practice sports in a persistent way. If both the participation and the expenditure figures are taken into account, it is found that an average Flemish household with school-aged children spends €1525 on sports, while individual sports expenditure is estimated at €352 (or €548 per sports participant). Moreover, sports participation has also an important instrumental value, as it augments health, psychological and social well-being, and thus reduces healthcare costs. The results of the current research support the government in determining the factors that prevent people from consuming sports participation.

In contrast to most previous research, the studies in this thesis investigate sports expenditure on a more detailed level (separate sports activities, separate expenditure categories, often-neglected background characteristics, etc.), by using sports-specific questionnaires and innovative data-gathering methodology (i.e. observation and diary approach). The research context in the different studies is Flanders, the Dutch-speaking part of Belgium. In the next paragraphs a short overview is given of the answers on the three main research questions that are the guiding theme in the seven papers (Chapters 4-10) of this doctoral thesis. These chapters are preceded by a general introduction to set out the conceptualisation, theoretical framework and the methodology and datasets that are used (Chapters 1-3). Finally, Chapter 11 wraps up the findings and provides implications for the government and the other sports providers.

The **first** research question is the following: what are the determining factors of spending money on sports participation (RQ1)? For the *socioeconomic* variables, it is unambiguously demonstrated that income positively influences expenditure on sports, while for the other variables of this group the relationship is less straightforward. Education only determines the probability that money is spent on sports, while no effect (or even a negative one) is found on the amount that is spent. Also for time scarcity only limited evidence is found, although there is a tendency towards substitution with non-sport leisure activities. The investigated *sociodemographic* variables play their role in determining sports expenditure, but their influence diminishes once people decided to take part in (a specific) sports (activity). For example, average expenditure by men is higher than it is for women, but this effect tends to disappear once male sports participants are compared to female.

When specific sports activities are investigated, it is clear that the *psychographic* and *sports-related* variables determine sports expenditure to a bigger extent than the sociodemographic and socioeconomic (except for income) variables. Indeed, the way that sports participants (un)consciously express their sports identity is of particular importance for the amount of money that they spend on sports. It is for example demonstrated that performance-based attitudes, interests, motivations and behaviours have a positive effect on sports expenditure, while a negative relationship is found for people who take part because of health or social reasons.

In Chapters 6 and 7, sports expenditure is investigated from a non-aggregated point of view, resulting in significant differences between the determinants of sports activities on the one hand, and expenditure categories on the other hand. Chapters 8, 9 and 10 build further on these findings by focussing on the

two most practiced sports activities in Flanders, cycling and running. This focus allows for questioning the expenditure categories in a more specific way, and to specify the background characteristics.

Because of the determining role of income in spending money on sports, the magnitude of this relationship is investigated in the **second** research question: to what extent is income a barrier in consuming sports (RQ2)? Chapters 5, 6 and 7 calculate income elasticities that stipulate the percentage change in expenditure, in response to a one percent change in income. For economic agents who are low on income, the effect of a one percent rise in income on the probability of spending money on sports is bigger, than is the case for high-income individuals. Put differently, monetary stimuli have far more effect on convincing lower income people to consume sports, than is the case for higher incomes. Nevertheless, it is the other way around for the amount that is spent, as the effect of an income-rise has an increasingly positive effect on the income elasticity.

Also for the income elasticities, relatively large differences exist between sports activities on the one hand, and expenditure categories on the other hand. For the former, the elasticities are higher for expensive (e.g. tennis, winter sports) and time-efficient (e.g. running) sports compared to other sports (e.g. walking, martial arts, cycling, fitness). For the latter, the 'mandatory' (e.g. footwear, equipment, clothing) and 'core' (sports events, membership fees) sports goods and services tend to have higher elasticity values than the non-necessary 'indirect' expenditure categories (e.g. sports holiday, transport by car, sports food and drinks, additional sports lessons).

Although the overall (Chapters 4 and 5) and non-aggregated (Chapters 6, 7 and 8) survey-based studies provide in a detailed insight in the sports expenditure patterns, questionnaires have certain drawbacks such as recall bias, tactical answers, obtrusiveness, non-response, etc. Therefore, the **third** research question is the following: what are the drawbacks of survey research, and how can they be tackled (RQ3)? In a first phase, detailed sports-specific questionnaires have been designed for Chapters 4-8 to map sports expenditure properly. Also, each study thoroughly discusses the zero-regression method that most suits the data. In a second phase, the last two papers (Chapters 9 and 10) in this doctoral thesis explore the potential of the observation and diary methods, two methods that have seldom been applied in socioeconomic research. On the one hand, it is shown that the observation of running event participants (Chapter 9) produces a large amount of 'objective' data about running apparel usage, without interference of the research subjects (and thus no non-response). As the expectations are that in the near future automatic picture analysation will be possible, these results open up interesting opportunities. Nevertheless, this also raises privacy issues, certainly because the majority of the mass sports participation events already takes pictures of its participants. On the other hand, Chapter 10 demonstrates that diary data allow for analysing sports apparel usage at a very non-aggregated level. It is for example shown that runners wear a more expensive outfit when they take part in a running event, compared to other running sessions.

The different chapters in the current doctoral thesis demonstrate that the governmental subsidising policy contributes to lowering the income barrier for sports participation. Yet, the results also suggest that the subsidising policy can be organised in a more efficient way. First, the income elasticities are higher for people who are low on income. Therefore, a budget neutral policy action that augments subsidies for these low-income agents and lowers the subsidies for high-income agents, would result in a higher average participation rate. Second, the results demonstrate that focussing solely on subsidising

sports club membership and sports infrastructure is probably not the most efficient strategy in raising sports participation rates. This is because expenses on sports club membership and admission fees only make up for a small part of total sports participation expenditure. It could therefore be effective to directly donate 'sports-vouchers', that can only be spent on sports-related services, to people who are low on income. These people can then decide to spend them on sports club membership, or on other sports expenses. Finally, government could also consider to differentiate between sports activities. As a low income elasticity is found for fitness (and for other sports such as walking, martial arts), government should not only apply price-reducing strategies, but also consider to focus on these sports activities in sports participation campaigns.

Despite the negative connotation that is sometimes associated with the commercial sector, it has contributed significantly in raising the sports participation rates. Enterprises can use the regression results of the current study to segment and target sports consumers, such that they can position themselves (and their products/services) more effectively. It is for example essential that sports enterprises understand that the socioeconomic and sociodemographic variables have a different impact on the decision to spend money on sports participation, and on the amount that is spent. This implies that extrapolating their non-representative client database to the whole population could result in counterproductive marketing strategies. The sociodemographic and the socioeconomic variables are found to primarily intervene in the decision to spend money on sports or not. Nevertheless, once people took the decision to take part in sports, it is mostly the psychographic and sports-related variables (and income) that determine the amount that is spent on sports.

Samenvatting | Dutch Summary

Het voorliggende doctoraat focust op de determinanten van de individuele en gezinsuitgaven aan sportparticipatie. Vanuit economisch oogpunt is dit een belangrijke onderwerp, aangezien de sportindustrie een significante en groeiende bijdrage levert aan de Westerse economische welvaart. Dit hoeft niet te verwonderen, aangezien met 64.3% een meerderheid van de Vlaamse bevolking minstens één keer per jaar sport. Om op een duurzame wijze sportactief te zijn, kopen deze sportparticipanten doorgaans meerdere sportgoederen en –diensten aan. Zo spendeert een gemiddeld Vlaams gezin met schoolgaande kind(eren) €1525 aan sportparticipatie, en een gemiddeld individu €352 (ofwel €548 per sportbeoefenaar). Naast de hierboven opgesomde rechtstreekse voordelen, biedt sportparticipatie ook aanzienlijke indirecte economische voordelen, zoals een betere fysieke, mentale en sociale gezondheid. Gezien het belang van de instrumentele waarde van sport voor de maatschappij, kan de overheid aan de hand van de resultaten in het voorliggende doctoraat een beter inzicht verwerven in welke groepen een mindere toegang hebben tot sportconsumptie.

In tegenstelling tot de meeste voorgaande studies, onderzoeken we de uitgaven aan sport vanuit een meer gedetailleerd perspectief (oa. meerdere uitgavencatgorieën, sportakken, achtergrondkenmerken), waarbij naast sportspecifieke vragenlijsten ook alternatieve, innovatieve dataverzamelingsmethoden gehanteerd worden zoals de dagboek- en observatiemethode. In de volgende paragrafen van de voorliggende samenvatting beschrijven we kort de drie overkoepelende onderzoeksvragen waarop de zeven studies van dit doctoraat (hoofdstukken 4-10) een antwoord trachten te bieden. Deze hoofdstukken worden voorafgegaan door een introductie over de conceptualisering, het theoretisch kader en de gehanteerde datasets (hoofdstuk 1-3). Tot slot vat hoofdstuk 11 de resultaten samen waarbij ook een aantal implicaties voor de verschillende spelers uit de overheid, de markt en het middenveld worden opgesomd.

De **eerste** onderzoeksvraag focust op de beïnvloedende factoren van sportuitgaven en staat centraal in alle zeven studies. Wat de *socio-economische* achtergrondkenmerken betreft, heeft inkomen een eenduidig positief effect op de sportuitgaven. De andere variabelen van deze groep hebben echter vaak een minder duidelijke relatie met sportuitgaven. Zo hebben mensen met een hogere opleiding een grotere kans om geld uit te geven aan sport, maar heeft opleiding geen significant (of zelfs een negatief) effect op het gespendeerde bedrag. Er zijn weinig tot geen indicaties van een negatief verband tussen algemene tijdsschaarste (bv. huishoudelijke taken, arbeidsuren) en sportuitgaven, al is er wel in beperkte mate sprake van een subsitutie tussen sportuitgaven en andere vrijetijdsactiviteiten.

Hoewel de meeste *sociodemografische* factoren de sportuitgaven significant beïnvloeden, tonen de studies in voorliggend doctoraat aan dat dit verband afneemt naarmate er enkel gefocust wordt op actieve participanten, of op beoefenaars van een specifieke sporttak. Zo geven mannen bijvoorbeeld meer geld uit aan sport dan vrouwen. Eens de beslissing is genomen om geld te besteden aan sport heeft het geslacht echter weinig invloed op de grootte van het uitgegeven bedrag.

Wanneer het onderzoek specifieke sporttakken (hoofdstukken 8, 9 en 10) analyseert, dan blijken het vooral de psychografische en de sportspecifieke kenmerken te zijn die de sportuitgaven bepalen. Behalve voor inkomen zijn de sportspecifieke uitgavenstudies niet eenduidig over de effecten van de meeste sociodemografische en de socio-economische variabelen op sportuitgaven. De wijze waarop sportparticipanten zowel bewust als onbewust hun sportidentiteit vormgeven, is van groot belang voor de mate waarin zij geld spenderen aan sport. Zo wordt er in de studies aangetoond dat op prestatie

gerichte attitudes, interesses, motivaties en gedrag een positief effect hebben op sportuitgaven, terwijl een negatief effect gevonden wordt voor mensen die sporten omwille van gezondheids- of sociale redenen.

Hoofdstukken 6 en 7 tonen aan dat de determinanten verschillen wanneer er respectievelijk meerdere uitgavencategorieën en sporttakken onderzocht worden. Hoofdstukken 8, 9 en 10 bouwen verder op deze conclusie, en spitsen zich toe op de twee meest beoefende sporttakken in Vlaanderen, met name fietsen en lopen. Een belangrijke meerwaarde van deze laatste hoofdstukken is dat een sporttakspecifieke focus het mogelijk maakt om de sportuitgavencategorieën meer afgelijnd te definiëren, en om meer specifieke achtergrondvariabelen te bevragen.

Gezien de bepalende rol van inkomen in het bedrag dat mensen uitgeven aan sportparticipatie, zoomt de **tweede** onderzoeksvraag in op de grootte van dit verband. Hoofdstukken 5, 6 en 7 berekenen inkomenselasticiteiten, die het effect weergeven van een relatieve verandering in inkomen op de uitgaven aan sport. In deze studies tonen we aan dat lage inkomens een groter effect ondervinden van een procentuele stijging in inkomen op de kans dat zij geld uitgeven aan sport. Concreet wil dit zeggen dat monetaire stimuli aanzienlijk meer effect hebben voor mensen met een laag inkomen ten opzichte van mensen die meer financiële middelen hebben. Omgekeerd kan men besluiten dat een inkomensstijging sterker doorweegt op het bedrag dat mensen met een hoog inkomen uitgeven, dan het geval is voor lage inkomens.

Ook voor de inkomenselasticiteiten bestaan er aanzienlijke verschillen tussen sportactiviteiten, en tussen uitgavencategorieën. Voor de sporttakken liggen de inkomenselasticiteiten relatief hoger voor dure (bv. tennis, wintersport) en tijdsefficiënte (bv. lopen) sporten dan het geval is voor andere sporttakken (bv. wandelen, gevechtsporten, fietsen, fitness). Uit de analyse van de uitgavencategorieën komt tot uiting dat de essentiële (bv. sportschoeisel, -materiaal, -kledij) en kern- (bv. sportevenementen, lidmaatschap) diensten en goederen doorgaans hogere waarden hebben dan de niet-noodzakelijke 'indirecte' uitgavencategoriën (bv. sportvakanties, verplaatsingskosten, sportvoedsel en –drank, aanvullende sportlessen).

Hoewel de surveygebaseerde studies (hoofdstukken 4, 5, 6, 7 en 8) een gedetailleerd inzicht bieden in het uitgavenpatroon van Vlaamse sporters, dient er opgemerkt te worden dat onderzoek aan de hand van vragenlijsten een aantal beperkingen heeft. Zo is het voor de respondent niet eenvoudig om zich bepaalde retrospectieve zaken (bv. uitgaven) gedetailleerd te herinneren, antwoorden respondenten soms bewust verkeerd (bv. minimaliseren, opscheppen), is er sprake van non-response, etc. Daarom onderzoeken we in de **derde** onderzoeksvraag in welke mate we kunnen corrigeren voor deze tekortkomingen, enerzijds door middel van aangepaste vragenlijsten en nulregressiemethoden, en anderzijds door middel van de observatie- en de dagboekmethode, twee dataverzamelingsmethodes die zelden gehanteerd worden in socio-economisch onderzoek. Hoofdstuk 9 is gebaseerd op een observatieanalyse van de kledij, schoenen en materiaal die evenementlopers gebruiken. Deze dataverzamelingsmethode resulteerde in een grote hoeveelheid objectieve data over àlle lopers, zonder dat we hiervoor beroep dienden te doen op de tijd van de respondenten. Aangezien een aantal belangrijke IT-bedrijven volop inzetten op automatische beeldherkenning in beeldmateriaal, kunnen we vermoeden dat deze methode in de nabije toekomst tot interessante inzichten in sportgoederengebruik zal leiden. Desalniettemin roepen deze evoluties ook privacygerelateerde vragen op, zeker aangezien bijna alle

massasportevenementen reeds foto's nemen van de deelnemers. Hoofdstuk 10 toont aan dat de dagboekmethode mogelijkheden biedt om de sportuitgaven op een zeer gedetailleerd niveau te onderzoeken. Eén van de bevindingen van deze studie is bijvoorbeeld dat mensen een duurdere outfit dragen wanneer ze deelnemen aan een loopevenement, dan bij een gewone training.

De resultaten van de studies van het voorliggende doctoraatsonderzoek impliceren dat men van overheidssubsidies een zeker milderend effect kan verwachten op de inkomensbarrière die het consumeren van sportparticipatie bemoeilijkt. Uit de bevindingen blijkt echter ook dat er efficiëntere en effectievere manieren zijn om het huidige sportsubsidiebeleid te organiseren. Een eerste idee vloeit voort uit de vaststelling dat de inkomenselasticiteiten hoger zijn voor mensen met een lager inkomen. Deze cijfers tonen immers aan dat de gemiddelde participatiecijfers budgetneutraal kunnen stijgen, door de subsidies voor mensen met een laag inkomen te verhogen ten koste van mensen met een hoger inkomen. Ten tweede blijkt uit de resultaten dat de sterke focus op clubgeorganiseerde sport en sportinfrastructuur niet noodzakelijk de juiste is. De descriptieve resultaten tonen immers aan dat sporters slechts een beperkt deel van hun sportuitgaven aan deze categorieën besteden. In plaats van de aanbodszijde te financieren, zou de overheid ook kunnen opteren om 'sportcheques' rechtstreeks aan haar burgers te doneren. De overheid kan dan zelf de bedragen bepalen die ze aan specifieke groepen (bv. mensen met een laag inkomen) geeft, en bovendien kan ze ervoor zorgen dat deze cheques aan een bredere waaier van sportgoederen en –diensten besteed kunnen worden. Tenslotte zou de overheid ook een onderscheid moeten maken tussen de verschillende sportactiviteiten. Aangezien voor sommige sportactiviteiten lage inkomenselasticiteiten werden gevonden (bv. fitness, wandelen, vechtsport), zal enkel het verlagen van de kostprijs niet de meest effectieve ingreep zijn. Deze activiteiten lenen zich dan weer zeer goed voor sportpromotiecampagnes bij mensen met een laag inkomen.

Ondanks de negatieve connotatie die de commerciële sector soms oproept, heeft voorgaand onderzoek duidelijk aangetoond dat deze sector een belangrijke rol heeft gespeeld in de gestegen sportuitgaven, maar ook in de toegenomen sportparticipatie. Aan de hand van de verschillende regressieresultaten van voorliggend doctoraat kunnen de sportbedrijven de markt segmenteren, zodat zij de verschillende segmenten effectiever kunnen bereiken. Meer bepaald is het essentieel dat zij begrijpen dat de socio-economische en sociodemografische factoren een verschillend effect hebben op de beslissing om al dan niet geld te besteden aan sport, versus het bedrag dat gespendeerd wordt. Concreet wil dit zeggen dat zij de significante verschillen in uitgaven die zij op basis van hun (niet-representatief samengestelde) klantenbestand vinden, niet zondermeer mogen extrapoleren naar de volledige bevolking. Tenslotte blijkt dat de sociodemografische en socio-economische variabelen nuttig zijn om een onderscheid te maken tussen wie geld besteedt aan sport, en wie niet. Eens de beslissing tot consumeren genomen is, zijn het echter voornamelijk de psychografische en sportspecifieke variabelen (en inkomen) die de grootte van het bedrag bepalen.

SECTION 1

GENERAL INTRODUCTION

CHAPTER 1
Rationale and Research Context

The first chapter gives a glimpse of the relevance of examining 'sports expenditure' and stipulates a preliminary outline of the research purpose and structure of this doctoral thesis (Paragraph 1). Also, it provides in a thorough conceptualisation of a number of essential concepts, namely sports industry, sports participation, sports expenditure, and top-level versus participation sports (Paragraph 2). Finally, sports popularity figures are given, together with estimates of the sports industry size, a schematic overview of the different sports providers that benefit from sports expenditure research, and the economic climate in which the research is conducted (Paragraph 3).

1. Introduction

To take part in sports, citizens have to acquire certain sports goods and services. Consequently, an important premise of this doctoral thesis is that taking part in sports is not free of charge, as there is no such thing as a free run. Sports consumption has grown substantially during the last decades, such that today it is a significant economic sector (Andreff & Andreff, 2009; Davies, 2002; Downward, Dawson & Dejonghe, 2009: 106). Sports enterprises have developed a wide range of specialised services and products (such as apparel and materials), adapted to the needs of an expanded variety of sports consumer segments (Ohl & Taks, 2007). Additionally, also the government and the sports club sector played their role in the development of the sports industry by organising mass sports events, financing specialised sports infrastructure and providing coaching services.

When most people think about the sports industry, the huge wages of professional athletes pop into their mind. Nevertheless, expenses on mass sports are far higher (Gratton & Taylor, 2000: 3). Because of the significant money expenditure on sports participation, research on this topic is relevant to the main sports goods and services providers in the commercial, governmental and voluntary club sports sector. Understanding the determining socioeconomic factors of sports expenditure is indeed essential in effective management and marketing in these three sectors (Downward et al., 2009: 128; Scheerder, 2007).

It is straightforward that sports enterprises need to get a thorough understanding of sports consumption, such that profits can be maximised by targeting specific segments of the sports market (Dixon, Backman, Backman & Norma, 2012; Scheerder, Vos & Taks, 2011). For the public sector the benefits of sports expenditure research are less commonly accepted, also because the term consumption often connotes with exploitation, social exclusion and the throw-away society (Ohl & Taks, 2007). Nevertheless, government has much to gain from a good functioning sports market (e.g. tax revenues, employment). Moreover, money expenditure on sports is of particular importance for the government, because taking part in sport requires the consumption of certain goods and services. Hence, the governing bodies need to gain insight in the sports consumption barriers, such that successful policies can be implemented that make sports participation accessible to all citizens (Downward, Lera-López & Rasciute, 2012; Gratton & Taylor, 2000: 118). As subsidising sports federations and sports clubs is one of the main governmental

tools for increasing sports participation rates, and given the governmental budget restrictions, research is needed about how an increase in sports consumption can be attained as efficient as possible.

The current thesis aims to investigate the determining factors of the amounts of money that people spend on sports participation, a subject that has been neglected in the field of sports management and sports economics (Downward, 2012). Which factors explain why individuals and households spend money on sports, and/or which barriers prevent them from consuming sports? Although most research uses questionnaires to answer these research questions, several methodological issues (e.g. response rates, excess zeros) arise (Bolger, Davis & Rafaeli, 2003), which are discussed in the general introduction and in the studies of the current doctoral thesis. The first five studies in this thesis (Chapters 4-8) are based on sports-specific expenditure questionnaires that were specifically designed to deal with certain methodological issues connected with survey-based research. In Chapters 9 and 10, alternative data-collection methods are applied, more particularly observation and a combined diary-inventory method.

All the studies of the current doctoral thesis have been conducted in the Policy in Sports and Physical Activity Research Group of the KU Leuven, and build further on the socioeconomic sports expenditure research tradition of the faculty (e.g. Késenne, Vanreusel & Van Langendonck, 2006; Scheerder et al., 2011; Taks, 1994).

2. Conceptualisation and definitions

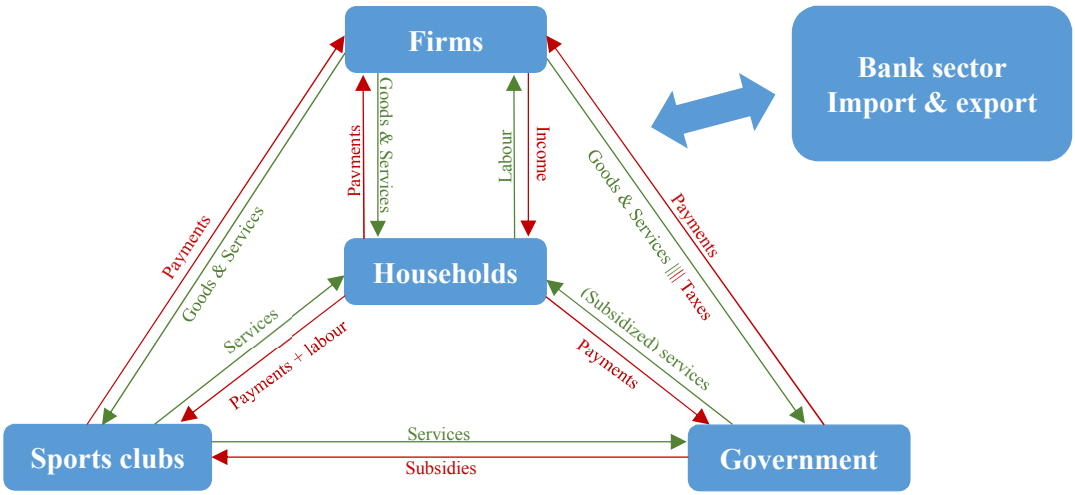
2.1. Sports industry

One of the corner stones of the sports industry are households and the expenses that they make on sports participation. A schematic overview of the relationships between the households and sports enterprises is given by Downward et al. (2009: 67). The basic idea in their model is that total expenditure of the households on sports is equal to the total value of the sports goods and services that are produced by the sports enterprises, which is also equal to the total amount of (labour and capital) income that is earned by producing these goods and services (Gratton & Taylor, 2000). Therefore, from a theoretical point of view, the impact of the economic industry calculated through these three methods should lead to the same result.

The sports enterprises are of course not the only providers of sports goods and sports services. In Figure 1.1 the circular household-enterprise-model of Downward et al. (2009: 67) is therefore extended with two other sports facilitators, namely the governmental and sports club sector. Government not only stimulates sports participation through subsidising sports federations (Flemish government) and sports clubs (local governments), but it also provides sports services directly to the citizens, such as infrastructure, lessons and events. This can be considered as a valid strategy, as in recent years the role of the formal sports club sector in attaining social policy has declined (Borgers, Vanreusel, Vos, Fosberg & Scheerder, 2016; Downward et al., 2012). Finally, the government also receives taxes from sports-related labour and sales (VAT).

Although Figure 1.1 offers valuable insights in the economics of sports participation, it is a schematic reduction of the economic reality because of the existence of a number of leakages. Two examples are given, as people can decide to save (a part of) their income instead of consuming it, and in Flanders many sports products are imported from abroad.

FIGURE 1.1
Economic circular flow model of goods and money in the sports sector



Source: extended model based on Downward, Dawson & Djonghe, 2009: 67

The reason why the current thesis analyses sports consumption from an expenditure point of view instead of the income and/or production approach, is twofold. The major argument is that the thesis' focus is on understanding human sports consumption behaviour, such that it is essential to describe sports expenditure on a microeconomic level. Another argument is that both theory and practice demonstrate that methodological issues arise when the production or income approach is applied (Késenne, Taks, Laporte & De Knop, 1998). The expenditure approach is straightforward to apply as it extrapolates average expenditure on sports participation, data that are mostly gathered through sports consumption surveys.

On the one hand, the production approach uses sports production data (i.e. value added) to calculate the gross domestic product. Applied to a sports context, the national accounts are broken into a number of institutional sports sectors, also referred to as 'satellite accounts'. By doing so, an estimate of the 'sports industry' is calculated that normally cannot be found in the standard national accounts (Andreff, 2006a). Nevertheless, a significant part of the sports goods and services belongs to other economic sectors (e.g. purchases of sports goods in non-sports goods clothing manufacturers and retailers), and is difficult to map through this method (e.g. Andreff, 2006b; European Commission, 2012: 1; Gratton & Taylor, 2000: 23; Primault, 2012). Also, because of the fact that numerous sports goods are imported (and exported), differences can be expected between the expenses of households/individuals on sports participation, and the production figures of enterprises. For Belgium, Harvey and Saint-Germain (2001) found an export-import-ratio of 47% in 1994, meaning that the import is twice as large as the export. Finally, Gratton and Taylor (2000: 22-24) conclude that calculations of the economic importance of sport are underestimations when they are based on production datasets, because the voluntary sector is (almost) not included in these figures. On the other hand, the income approach uses data about employment and earnings to estimate the salary and wages of a specific industry. Nevertheless, similar problems arise

when using income data as is the case for production data: high import ratios, sports expenses on goods/services that belong to other economic sectors, etc.

The above drawbacks of production-based and income-based data are demonstrated by empirical research that calculates the Flemish sports industry size (Thibaut, Scheerder, Vandermeerschen, Borgers & Vos, 2013). This study shows that a significant part of the sports purchases takes place in retail stores for which no data could be retrieved in the available dataset (i.e. the dataset Amadeus of Bureau Van Dyck), mostly because their turnover is relatively low such that they do not have to turn in these data.

2.2. Sports consumption

The literature distinguishes between the concepts sports consumption, sports participation and sports expenditure. *Sports consumption* is defined as the process that consists of two related decisions, *sports participation* on the one hand, and *sports expenditure* on the other hand (e.g. Downward et al., 2009: 66). The amount of sports expenses is strongly related to sports participation decisions (Davies, 2002), and as will be explained in Chapter 2 (Paragraph 1), the current thesis assumes that taking part in sports in a sustainable way is not possible without spending money. Because of the connectivity between sports participation and sports expenditure, and because little agreement exists about their definition, it is essential for this doctoral thesis to define both concepts.

2.2.1. Sports participation

In the literature no generally-accepted definition of sports participation exists (Gratton & Taylor, 2000: 6; Primault, 2012; Scheerder, 2003; Scheerder & Vos, 2013: 13), which is also reflected by the different sports activities (e.g. are playing chess, fishing, walking to the store sports activities or not?) that are included in the definition of 'sports' in the previous sports participation studies (Downward et al., 2012). Therefore, it is not straightforward to compare the results obtained by the different sports participation studies. In the past, sports participation was too often limited to traditional (team) games and competitive activities, while today the focus is more on a whole range of physical activities (Downward et al., 2012). Based on the literature, agreement exists about a number of characteristics:

- Most of the sports participation definitions assume a minimum level of physical exertion (Gratton & Taylor, 2000: 7; Scheerder, Vandermeerschen, Borgers, Thibaut & Vos, 2013: 48), thereby ruling out certain activities (e.g. darts, fishing and snooker).
- Another characteristic that is commonly adopted is that all activities should be practiced for recreational purposes (Gratton & Taylor, 2000: 7). Therefore, physical activities such as gardening, going shopping by foot, and commuting are left out of most studies.
- Some studies also require a minimum participation frequency, such as 'at least once a week', 'per month' or even 'per year' (Scheerder & Vos, 2013: 19; Taks, 1994: 24). Studies that choose for the latter option thus also include occasional forms of sports participation. Nevertheless, they often opt to incorporate frequency, duration and/or intensity questions that make it possible to differentiate between occasional and frequent participants. In this thesis, the latter option is chosen.

The above generally-accepted characteristics are applied in all studies of the current thesis. As for some aspects differences exist between the separate studies, we refer to the specific studies for the exact sports participation definition that is used.

2.2.2. Sports expenditure

Based on a number of characteristics, the large assortment of sports expenditure definitions can be divided into different categories.

A first part of the literature describes expenditure on overall sports participation, while the second part focusses on specific sports activities. On the one hand, the former category has the advantage that most policy makers are not interested in the sports activities that individuals and/or households spend their money on. This is because most (health) benefits can be attained through a wide variety of sports activities, such that the government is only concerned about raising overall sports participation figures. On the other hand, companies and sports federations that focus on a specific sports activity, benefit from sports-specific research. From a methodological point of view, a disadvantage of the overall expenditure studies is that sports expenditure is questioned through generally-formulated expenditure categories, as they have to transcend the diverse consumption patterns on a wide variety of sports activities. Focussing on a specific activity such as golf (Hallmann & Wicker, 2015) or triathlon (Wicker, Prinz & Weimar, 2013) indeed offers the opportunity to specify the overall expenditure categories, resulting in more detailed consumption data. For specific sports activities, the relatively vague category 'sports apparel' (or sports clothing, footwear, equipment) can for example be specified into more detailed product categories such as wind jackets, cycling pants, helmets, cycling-GPS, golf clubs, bags, trolleys, etc.

A second remark is that in the previous literature no consensus is found about the expenditure categories that should be categorised as 'sports expenditure', and the ones that should not. A point of discussion is the categorisation of the so-called indirect expenditure categories. Indirect sports expenditure are expenses during sports participation, but belonging to other economic sectors (such as transport costs, sports drinks and sports food, extra childcare expenses, etc.) (Késenne & Butzen, 1987; Késenne, Couder & De Maesschalck, 1987; Taks & Késenne, 2000). As the indirect expenses take place in a sports context, and because they make part of the 'cost' of participating in a specific sports activity, one could plead to include them. Nevertheless, when sports consumption is investigated together with other non-sport economic sectors, the indirect expenses are often attributed to the latter. For certain studies, it is therefore not possible to distil the aforementioned indirect expenditure categories, as they are based on secondary datasets (e.g. Dardis, Soberon-Ferrer & Patro, 1994; Løyland & Ringstad, 2009; Pawlowski & Breuer, 2011; 2012a) or on production databases such as Belfirst or Amadeus (Bureau Van Dyck). Downward et al. (2009: 105) for example notice that non-aggregated sports expenditure research based on sports-specific datasets is very limited. Davies (2002) argues that secondary datasets are not suited to estimate sports-related expenditure. Although we agree that sports consumption datasets should be preferred when answering certain sports-related research questions, it should eventually be the research purpose that determines the kind of data that is opted for. Indeed, (non-sports) overall datasets can for example be useful when comparing sports consumption with other expenses.

A third consideration is the detail level of the expenditure question. Advantages of listing an extensive number of detailed expenditure categories are that the respondents are supported in recalling their sports expenses without overlooking specific categories (Wicker et al., 2013), that it clearly defines what is meant with 'sports expenditure' and that it allows for analyses on specific expenditure categories. Nevertheless, expenditure categories are often combined to reduce the length of the questionnaires and thus increase the response rate, especially in non-sports-specific secondary surveys.

TABLE 1.1

Overview of the expenditure categories (above) and – if applicable – the specific sports activities (below) that are included in international peer-reviewed sports expenditure studies

	Sports club Membership	Facilities	Equipment	Footwear	Clothing	Training/ instruction	Transport	Holliday	Food & Drink	Socialising	Medical/ body care	Information (book, DVD, etc.)	Time	Physical Education	Spectator Sports
Davies, 2002		■	■	■	■	■	■	■	■			■			■
Eakins, 2015	■	■	■			■									■
Humphreys & Ruseski, 2009			■	■	■										■
Késenne & Butzen, 1987	■	■	■	■	■	■	■	■	■				■		
Lamb et al., 1992	■	■	■	■	■		■					■			
Lera-López & Rapún-Gárate, 2005; 2007	■	■	■	■	■	■	■								
Pawlowski & Breuer, 2011; 2012	■														■
Scheerder et al., 2011			■	■	■										
Taks & Kesenne, 2000	■	■	■	■	■	■	■	■	■	■	■			■	■
Taks, Renson & Vanreusel, 1994	■	■	■	■	■	■	■	■	■	■	■		■		
Thibaut, Vos & Scheerder, 2014	■	■	■	■	■	■	■	■	■	■	■				
Wicker, Breuer & Pawlowski, 2010	■	■	■	■	■	■	■	■	■	■	■	■			
Hallmann & Wicker, 2015	■	■	■	■	■			■				■			
Thibaut, Vos, Lagae, Van Puyenbroeck & Scheerder, 2016	■	■	■	■	■	■	■	■	■	■	■	■			
Wicker et al., 2013	■	■	■	■	■	■	■	■	■	■	■	■			

	Athletics	Badminton	Basketball	Cycling	Dancing	Diving	Equestrian	Field hockey	Fitness	Golf	Gymnastics	Handball	Judo	Mountain Sports	Sailing	Shooting	Ski	Soccer	Swimming	Table Tennis	Tennis	Triathlon	Volleyball
Hallmann & Wicker, 2015						■				■													
Kesenne & Butzen, 1987																		■	■		■		■
Pawlowski & Breuer, 2011; 2012					Le				■								Li		P				
Thibaut et al., 2016				■																			
Wicker et al., 2010	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■
Wicker et al., 2013																						■	

Le= only expenditure on lessons are included; Li = only lift fees are included; P = only swimming pools are included

Table 1.1 gives an overview of the conceptualisation of sports expenditure in the most relevant sports expenditure studies that have been published in international peer-reviewed journals. The table shows that significant discrepancies exist, making it difficult to compare the results of the studies (Pawlowski & Breuer, 2012b). Despite small differences due to practical issues (e.g. specific sports activities, data-gathering methodology, collaborations with other institutions), all the questionnaire-based studies of the current doctoral thesis share a number of characteristics, such as the inclusion of both direct and indirect expenditure categories, while expenditure on attendance and television broadcasts of professional sporting events are excluded.

2.3. Two different worlds: sports participation versus professional sports

In the former paragraph the concepts sports participation and sports expenditure have been conceptualised. One of the reasons why expenses on spectator sports are not included in this doctoral thesis, is because Lera-López and Rapún-Gárate (2011) demonstrate that many differences exist between the determinants of sports participation and attending elite sports events. Although relatively much socioeconomic research exists regarding the attendance of professional sports events and watching these events on TV/internet/social media/etc., only few studies and textbooks focussed on sports participation expenditure (Downward et al., 2009: 114). This is a remarkable finding, as from an economic impact point of view, total expenses on sports participation are much higher than the ones on professional sports (e.g. Késenne et al., 1998; Pawlowski & Breuer, 2012b). Also, sports participation has a higher instrumental value than elite sports, as it increases life expectation, health, social cohesion, and combats obesity, absenteeism at work, and crime (Gratton & Taylor, 2000: 104-116; Nys, 2012). The current doctoral thesis aims to fill this gap in the literature by focussing exclusively on participation sports, and not on professional, paid sports.

The church model (Scheerder, 2007: 24; Scheerder & Vos, 2013: 147) gives a schematic overview of the relationship between top-level sports, sports participation and active leisure. An important aspect of this figure is that it demonstrates that, in contrast to the classic sports pyramid (e.g. Gratton & Taylor, 2000: 4), a large part of the participation sports (e.g. start-to run, recreational swimming) is not at all related to top-level sports and should thus be situated outside the 'pyramid', in the 'nave' of the church. Because for the current thesis both the conceptualisation of sports participation and sports expenditure are essential, an extended version of the church model is presented in Figure 1.2.

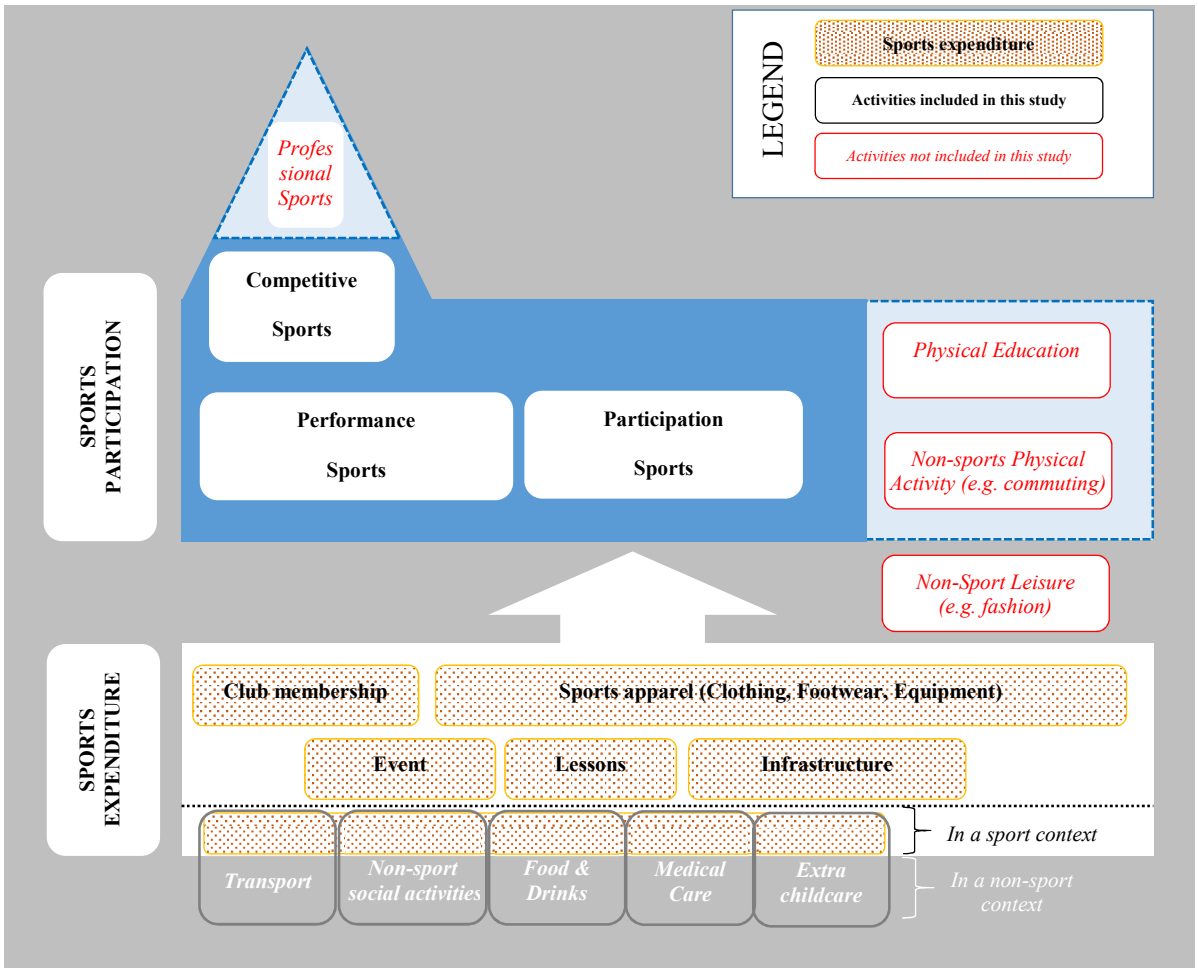
First, the most striking extension is that the expenditure categories are added as the fundaments of the church, because of their interconnectivity with sports participation. When taking part in sports, people normally spend money on at least certain of the *direct expenditure categories*, such as sports clothing, footwear, etc. Often, these sports participants also spend money on non-sports goods and services (e.g. travel costs, expenditure on social activities, etc.). Primault (2012) refers to the latter categories as 'induced activities', while Késenne and Butzen (1987) call them '*indirect expenditure categories*'. Because only a small proportion of the expenses on the latter categories is meant for sports purposes, these sectors are put outside the church in Figure 1.2.

Second, certain zones of the church are put in a lighter shade, because in some studies these categories are included, while it has been stipulated in the definition in Paragraph 2.2.1 that this is not the case for the current doctoral thesis. Examples are the activities (and thus the expenses on) *professional sports*, *physical education* and other *non-sport physical activities* (e.g. commuting by bike).

Third, it should also be noted that sometimes also 'sports' goods/services are bought for activities that should be situated outside the sports participation church model. For example when they are bought for active (e.g. clothing for playgrounds, membership fees for the Scout Movement) and passive (e.g. wearing sports sneakers for fashion purposes) *non-sports leisure*. As indicated in Figure 1.2, this is especially the case for sports apparel.

The three above-mentioned remarks again highlight the advantages of using expenditure data instead of production data (see also Paragraph 2.1), as they all imply that for production data it is more difficult to detangle sports apparel that is bought for sports participation purposes, from sports apparel that is not.

FIGURE 1.2
The church model applied on sports expenditure, with the direct and indirect expenditure categories



Source: extended adaptation of Scheerder (2007: 24) and Scheerder & Vos (2013: 147) with concepts of Downward et al. (2009: 38) and Gratton & Taylor (2000: 4)

3. Outlining the research field

The previous part documented that the current doctoral thesis investigates sports participation expenditure from a microeconomic point of view and operationalised the relevant concepts in this matter. The current paragraph sets out the research field. Information is provided about the sports-expenditure-related trends and evolutions. and an overview is given of the sectors for which the results of this thesis are relevant.

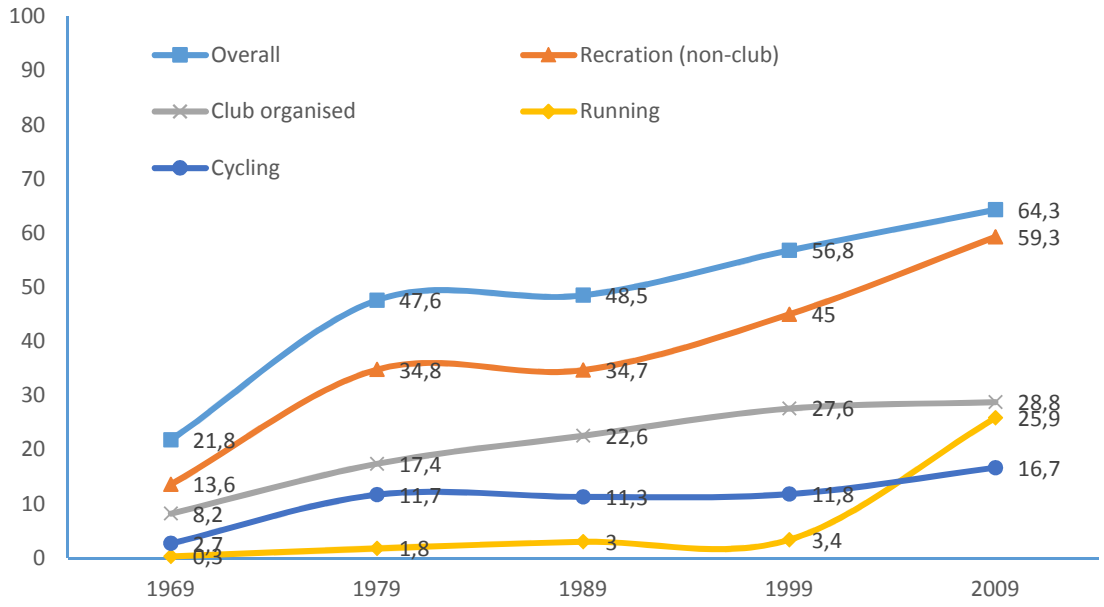
3.1. Evolution of sports participation

The economic importance of the sports participation industry depends on the total number of sports participants on the one hand, and the average expenditure per person on the other hand. In Figure 1.3 we focus on the former, using Flemish participation figures that date back to 1969 (Scheerder et al., 2013).

In the last decades, there has been a steep rise in the popularity of sports participation in Flanders, from 22% in 1969 to 64% in 2009. The fact that almost two out of three Flemish citizens practice sports at least once a year, makes that sports participation is a significant economic sector with a lot of (potential) customers. Nevertheless, caution is needed regarding future evolutions, as certain sources indicate that sports participation rates are stagnating or even declining in certain countries such as Canada and the US (Downward et al., 2012), England and The Netherlands (Van Bottenburg, 2005), and Italy and Sweden (Scheerder, Vandermeerschen, Van Tuyckom, Hoekman, Breedveld & Vos, 2011).

FIGURE 1.3

Evolution of the share of the population (12-75 years) that is an active sports participant (overall), recreational sports participant, sports club member, runner and/or cyclist



Source: Scheerder et al., 2013

3.2. Popularity of sports activities

Figure 1.3 also demonstrates that the upwards evolution in sports participation figures is mostly due to sports that are practiced outside the boundaries of sports clubs, as the evolution in the number of sports club members has flattened out (Scheerder et al., 2013). Running and cycling are prime examples of sports activities that are often practiced in a non-club organised setting, and they became two of the most popular participation sports among Flemish adults (Scheerder et al., 2013). Sports participation faced a shift towards more flexibility and autonomy for its practitioners, meaning that a significant part of today's sports participants prefer to choose the place and time for their sports activities (Borgers,

Pilgaard, Vanreusel & Scheerder, 2016), a trend that is also noticed in other countries (Downward et al., 2009: 140).

The popularity of 'light' sport settings (i.e. sports activities that are practiced in other than club-organised settings) can also be noticed in the list of the most practiced sports activities by Flemish citizens aged between 15 and 86 (Scheerder, Borgers & Willem, 2015). The most popular sports activities are typical non-club sports, namely recreational cycling (25.9% of the sports active population), hiking/walking (21.9%), running (20.0%), fitness (16.4%) and recreational swimming (11.8%). At the sixth place is soccer (9.4%), a typical club sports, followed by road bicycle racing (4.5%), dancing (4.4%), winter sports (4.2%) and tennis (3.7%). The studies in the current doctoral thesis not only focus on overall sports expenditure, but also on the most practiced sports activities, with special attention towards running and cycling.

3.3. Size of the sports industry

Estimates of the sports industry paint a picture of the relative importance of sports participation for the overall economy, and provide economic arguments why it is an essential sector in modern society.

The economic impact of the sports participation industry has increased over the last four decades, more than is the case for other leisure and non-leisure sectors (e.g. Andreff & Andreff, 2009; Andreff & Szymanski, 2006: 4; Davies, 2002; Downward et al., 2009: 105; Ohl & Taks, 2008; Pitss & Stotlar, 2007). The usage of different methodologies to estimate the sports industry (see also Paragraph 2.1) makes that one should be careful with comparing the results. This explicitly goes for figures that are based on production data (e.g. national accounts), as they underestimate the actual economic value (Andreff & Andreff, 2009; Davies, 2002; Gratton & Taylor, 2000: 29; Halleux, 2015). Also, comparison of the results is difficult because often different conceptualisations of the 'sports industry' are applied that include certain 'sports categories', while excluding others.

3.3.1 International

Andreff and Andreff (2009) state that the sports sector accounts for 0.5-1% of the total international trade. The US, one of the biggest markets for sports goods and services, has an estimated value ranging from $44 to $60 billion dollars in 2005 (Humphreys & Ruseski, 2009). For Europe, comparable information about the economic importance of the sports industry has always been scarce. Via the research project Sport Satellite Accounts (SSAs) a common methodology has been developed, allowing for extracting sports production data from the National Accounts (European Commission, 2016). The first results indicate that the sports-related added value for the European Union is approximately 3.0% or 294.4 billion Euros when the indirect effects are included, while the sports-related employment amounts to 3.5%, the equivalent of 7.3 million persons. Nevertheless, the study of Primault (2012) demonstrates that a different methodology results in different figures. His study is based on the classic sports sector (NACE-code 92.6), finding a sports employment rate for France and the UK of respectively 0.16% and 0.38% of the total population.

3.3.2 Flanders

The focus of the current doctoral thesis is on Flanders, the Dutch speaking part of Belgium. Flemish citizens are relatively big spenders on active sports participation when compared to most other European

countries (Pawlowski & Breuer, 2012b). In Flanders, Késenne et al. (1998) estimated the economic significance of sports participation for 1997[1]. Based on interviews for an extensive amount of direct and indirect expenditure categories, they found that an average Flemish household spent €1480 on active sports participation, €272 on passive sports participation and €25 on physical education. Extrapolated to the whole population, this resulted in a total economic value of 4.1 billion Euros.

More recent research of 2014[1] is based on extrapolations of survey-based expenditure data, resulting in an amount of 1.8 billion Euros that is annually spent on overall sports participation with expenditure on physical education and passive sports consumption excluded (Scheerder, Thibaut & Willem, 2015).

Apart from the households, also government spends large amounts of money on sports participation. For 1997, total governmental expenditure on participation sports was estimated at 245 million euros, and 128 million Euros on physical education (Késenne et al., 1998). For 2004[1] it was found that 498 million Euros was spent on sports by the government, of which 75% was on sports participation, and 25% on top-level sports.

When the above figures for households and government are put together, the total economic importance of the sports sector is given. Based on an input-output-analysis on the above results, Késenne et al. (1998) found that the gross domestic sports product for Flanders – corrected for import and export – was estimated at 4.2 billion Euros in 1997[1], or more than 3% of total GDP.

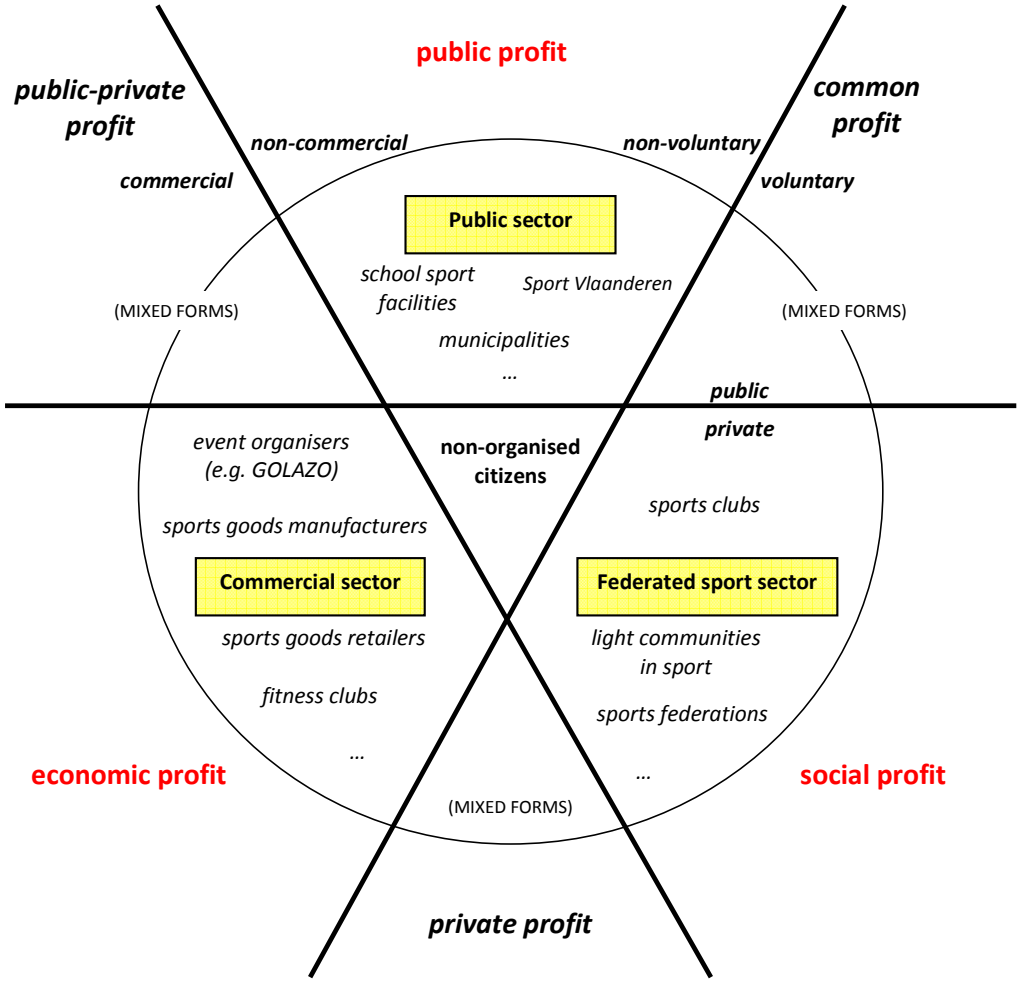
3.4. Sports providers

As indicated in the circular flow model of sports expenditure (see Figure 1.1 in Paragraph 2.1), there are many providers of sports goods and/or sports services. Based on the structural model of Figure 1.4 (Scheerder, 2007: 19), these sports providers can be divided into three main sectors, i.e. the voluntary sector, the public sector and the commercial sector.

Because of the connectivity between sports participation and sports expenditure, the results of the current thesis are of particular importance to these three sectors. While the value of sports participation is generally-accepted, this is less evident for sports expenditure, as Ohl and Taks (2007) state that this concept is often associated with exploitation (e.g. sporting goods industry in Eastern countries), environmental issues, etc. Despite this negative connotation, it is undeniable that the acquisition of sports goods and services is necessary to take part in sports in a persistent way. Indeed, in the current thesis it is assumed that to take part in sport in a sustainable way, people have to spend money. The following paragraphs demonstrate how the sports organisations and enterprises of these three sectors benefit from research regarding the determining factors of sports expenditure.

[1] Based on the Consumer Price Index (CPI) the values of 1997, 2004 and 2014 should be multiplied with respectively 1.42, 1.26 and 1,02 to compare the results with base year 2016

FIGURE 1.4
Structural model for the major sports providers



Based on Scheerder, 2007: 19

When thinking about sports expenditure, the first player that comes in mind is the commercial sector. Although this is a relatively new sector in the field of sports participation, last decades it has grown at a very fast pace (Downward et al., 2009: 135; Scheerder & Vos, 2013: 51). The main objective of the commercial sector is augmenting economic profit. Citizens can buy a wide variety of sports goods (equipment, clothing, footwear, heart rate monitors, etc.) that are manufactured in sports enterprises and distributed through retail stores and warehouses. But last years there is also a growing amount of commercial mass sports events, lessons, classes and other services on which sports consumers can spend their money. It is therefore essential that enterprises develop an understanding of the influencing factors of sports expenditure in order to optimise the segmentation process, and to increase their profits.

Although for the public sector the focus on sports expenditure may seem less obvious, numerous arguments can be found. First, the sports participation sector contributes to an economy in a good shape, as sports participation expenses grow at a faster pace when compared to other industries (Andreff & Andreff, 2009). Indeed, as demonstrated in Chapter 1 Paragraph 2.2, sports participation has a significant share in a country's GDP and employment, thereby providing the central government with substantial tax revenue (Gratton & Taylor, 2000: 99). Second, and probably the prime reason why

government invests money in sports participation, is because of its instrumental value. By stimulating and subsidising sports participation, the government aims to increase the market efficiency by correcting for market failures, because citizens tend to underconsume sports participation. The fact that most people are aware of the advantages of sports participation such as increased health (e.g. by reducing obesity related diseases), social well-being (e.g. sports clubs), etc. (Cawley, 2004; Cochran & Malone, 2005; Downward et al., 2009: 124; Scheerder & Vandermeerschen, 2013: 207), makes that sports participation should not be considered a merit good. Nevertheless, an economic rationale for government intervention in sports is that economic agents do not sufficiently internalise the positive externalities that are associated with sports participation, and are thus underconsumers of sports (Downward et al., 2009: 124). To augment sports participation, government should therefore understand the factors that hold back people from consuming sports participation, as sustainable sports participation always involves money expenditure. In this matter, the effect of today's economic difficult times and growing inequality and poverty rates (see also Paragraph 3.5) on sports consumption is of particular importance for the government. In Flanders and most other European countries, government aims to reach these goals by subsidising sports clubs, sports federations and sports infrastructure (Borgers et al., 2015; Scheerder & Vandermeerschen, 2013: 269). It can thus be argued that the subsidies are primarily used to directly and indirectly reduce sports club membership fees. To increase the efficiency and to optimise the effects of its sports policy, government needs to get insight in the amounts that citizens spend on specific sports activities (e.g. running versus soccer) and on sports expenditure categories (e.g. expenditure on clothing, material, shoes versus a sole focus on sports club membership costs).

The last, although from a historical perspective the first, key player that should benefit from sports consumption research is the voluntary sector (Gratton & Taylor, 2000: 142; Scheerder, 2007). Sports federations and sports clubs need to be aware which individuals are the big spenders, but also – more important – which people do not spend money on sports in general, and on sports club membership fees in particular. Based on these findings, they can adapt their marketing strategies and their sports supply in order to persuade certain population groups to get involved in (organised) sports participation. Another example is that, given the fact that half of the sports clubs are affected by the last economic crisis, a potential strategy of the sports club could be to augment the membership fees (Hoekman & Straatmeijer, 2013; Scheerder, Seghers, Meganck, Vandermeerschen & Vos, 2015). Sports clubs need to get insight in the expenditure patterns of their members in order to get an idea of the possible effects of such financial interventions. Research has for example demonstrated that higher membership fees not always raise the turnover of the sports clubs, because the price elasticities are close to one (Vekeman, Colpaert, Praet, Meulders & Scheerder, 2014).

The importance of the results for the three key sports providers – government, market, voluntary sector – will be taken into account in the overall discussion/conclusion and in the different papers of this doctoral thesis.

3.5. Economic climate

Some of the datasets that are used in the current thesis are gathered during the recession that followed the financial banking crisis of 2007-2008. It is therefore essential to elaborate on the consequences of the economic crisis on sports expenditure.

First, the economic crisis had an impact on the unemployment rates in Europe (Roberts, 2015). As sports consumption is related to income, it can be expected that the economic crisis had a negative effect on the consumption figures. Although for Flanders a rise in the unemployment rate can be noticed after 2007, the rise is relatively restricted, especially when compared with other countries such as Great Britain (Roberts, 2015), the Netherlands (Hoekman & Straatmeijer, 2013) or the European Union as a whole (Figure 1.5). Moreover, only a limited effect is found of the economic crisis on the nominal average income of Belgian households (Figure 1.5).

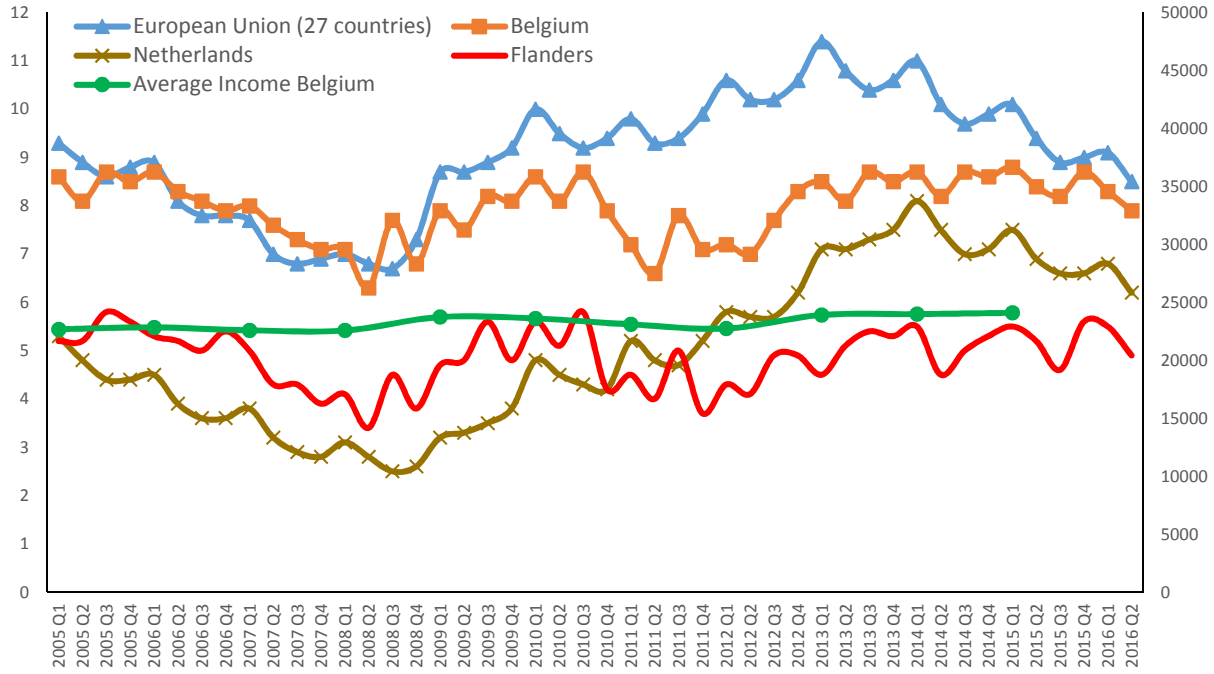
Roberts (2015) reports that British households cut back money expenditure on sports during the recession, although the sports participation rates remained more or less constant. For Flanders, overall expenditure can be deduced from the Household Budget Survey (BeStat, 2016). For every year of the period 1999-2010, data were gathered of approximately 1800 Flemish families through a consumer expenditure diary, for an extensive number of products and services. From 2012, the procedure changed to a shorter (less product and service categories) biannual survey, and the number of surveyed Flemish households rose to approximately 3000. Figure 1.6 gives an overview of the results, that have been adapted to the consumer price index, such that nominal prices are compared. The figures indicate that although there have been cutbacks in 2008 and 2012, overall expenditure remained more or less at the same level. Another finding is that sports participation expenditure only accounts for (less than) one percent of total expenditure. Nevertheless, these numbers give a glimpse of the importance of sports-specific expenditure databases, as much of the sports expenses (e.g. part of clothing/footwear, bikes and other equipment, transport, medical care, social activities such as cafeterias, sports food and drinks, etc.) are not included in the sports expenditure category in the BeStat-dataset. Paragraph 1.1.3 in Chapter 3 deals with these methodological issues.

A second consequence of the economic crisis is the budgetary difficulties experienced by the European governments. This possibly could have resulted in a diminished governmental budget for sports purposes, and thus less subsidies for sports clubs, sports federations and sports infrastructure. Research indeed indicates that the sports participation policy domain also had to deal with the effects of the economic crisis (van Poppel, Scheerder & Vandermeerschen, 2016). Nevertheless, the effects for the Flemish sports sector were lower than was the case in the United Kingdom (Roberts, 2015) and in the Netherlands (Hoekman & Straatmeijer, 2013).

Third, the economic crisis is expected to increase the poverty rates and social inequality. Research demonstrated that, due to the recent recession, the lower-economic strata suffered the most concerning their leisure consumption (Roberts, 2015). The risen poverty rates are thus a relevant topic, as Vandermeerschen (2016) shows that people in poverty face multiple barriers in consuming sports participation.

FIGURE 1.5

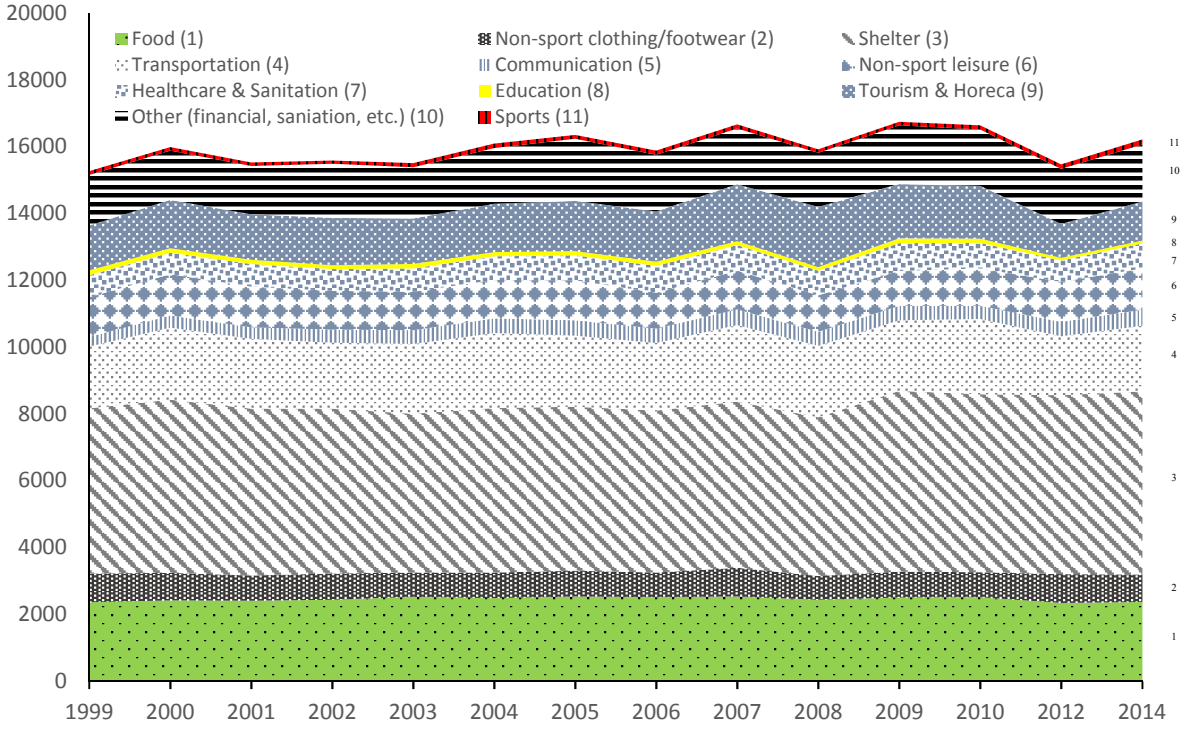
Evolution of the unemployment rate between 2005 and 2016 for the EU, Belgium and the Netherlands (age 25-74) and for Flanders (age 15-65) on the one hand (left vertical axis), and evolution of total average year income of Belgian households (right vertical axis)



Adaptation based on Eurostat (2016) and Statbel (2016a, 2016b)

FIGURE 1.6

Average annual expenditure on goods/services by Flemish citizens for 1999-2010 (N=±1800 HH) and 2012-2014 (N=±3000 HH), in real prices (adapted to the consumer price index)



Adaptation based on BeStat, 2016

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CHAPTER 2
Theoretical Framework

While the former chapter set out the concepts and the research context of sports expenditure, the second chapter explains how sports consumption is studied from an economic point of view (Paragraph 1). The orthodox/neoclassical and the heterodox approach are discussed in detail (Paragraph 2), both of which have been applied in the different papers of this manuscript (Chapter 4-10). An extensive literature overview of the determining factors of sports expenditure is provided (Paragraph 3), followed by a summarisation of the gaps in theh existing sports expenditure research (Paragraph 4), that eventually lead to the research questions of this doctoral thesis (Paragraph 5).

1. Consumption behaviour

One of the aims of (sports) economists is to explain human behaviour. For this matter theoretical models have been developed that outline the most salient factors, while making abstraction of the details (Cawley, 2004). As the current thesis focusses on the determining factors of the decision of economic agents to spend money on sports participation, an adequate consumer behaviour theoretical framework is essential.

Downward, Dawson and Dejonghe (2009: 66) present a flow chart of an economic model that describes how economic agents make specific choices (e.g. consuming sports), driven by certain motives (tastes, preferences, objectives) and restricted by the economic resources income and time, and the sports supply that is available (e.g. infrastructure). The result of their choices can be deduced from their behaviour. The schematic model of Downward et al. (2009: 66) assumes that sports expenses stem from the sports participation decision. Although there is no doubt that a close relationship exists between sports participation and sports expenditure (e.g. Davies, 2002; Downward, 2012), a number of arguments suggest an alternative, non-sequential relationship between sports expenditure and sports participation.

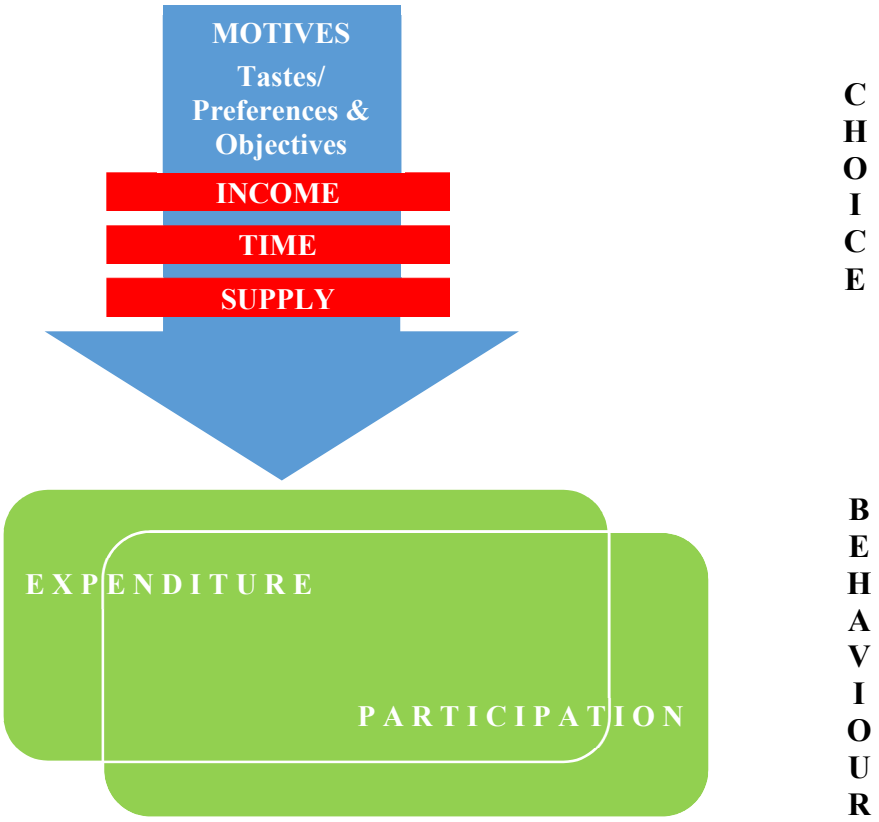
First, while the sports participation decision indeed takes place before people spend money on sports, the actual behaviour of spending money mostly precedes the sports participation behaviour, or takes place simultaneously (Gratton & Taylor, 2000: 49). A soccer player, for example, first needs to acquire an outfit before he/she will be seen taking part in sport, and a swimmer has to buy an admission ticket first. The more frequent the sports participation, the more money the economic agent spends on sports apparel and other soccer related goods and services, again confirming the mutual relationship between sports participation and sports expenditure. The latter is at odds with the one-way causality as assumed in the orthodox economic theory (Downward et al., 2009:76). In the next paragraph we will discuss the (other) qualities of orthodox and heterodox economic theories. Also, the graphical presentation of expenditure and participation underlines the close relationship between sports participation and sports expenditure, as the one of the main premises of this thesis is that sustainable sports participation is not possible without spending money on sports.

Second, the sports participation and expenditure decision are not necessarily mutually inclusive, as the former can occur without the latter, or the other way around. Indeed, on the one hand individuals can be

found taking part in sports, without spending money (Scheerder, Vos & Taks, 2011). In most studies there are sports participants who did not buy any goods or services in the researched period, or practiced the sports activities for free. This is because most sports goods are durable goods and their depreciation rate often exceeds the reference period of the survey (Gratton & Taylor, 2000: 148), or because participants only have to pay once for certain services that last for an extensive period (e.g. sports club membership). On the other hand, people sometimes spend money on sports goods and services, without practicing sports. An example is a one-year fitness membership for a person that quits after a couple of times. Because of the above reasons, a non-sequential relationship between sports expenditure and sports participation is proposed in Figure 2.1.

In the studies of the current thesis, the economic decision to consume sports is investigated, subject to income constraints, preferences/tastes, and time. As the focus in this manuscript is mostly on overall sports expenditure and on cycling and running expenses, sports infrastructure is less an issue, as the most practiced sports activities (i.e. running, cycling and walking) do not need a specific sports infrastructure. In addition, it is assumed that sports infrastructure possibly prevents people from practicing a specific sport, but that enough alternative sports activities are at hand.

FIGURE 2.1
A theoretical flowchart of the economic decision to consume sports



Extended adaptation of Downward et al., 2009: 66

2. Socioeconomic theories

In the current paragraph an overview is given of the two main schools of thought in the economic field, namely the orthodox and the heterodox economic theory (Downward & Riordan, 2007). The predictions of these different theories about the effect that the independent variables have on sports consumption are generally the same. The positive effect of the income-expenditure relationship is for example suggested by both the orthodox and the heterodox approach. Nevertheless, the theories differ in their explanations of *why* these relationships can be expected, as will be explained in the following sections.

2.1. Orthodox economic theory

A first category of approaches is the neoclassical 'orthodox' theories that start from the individual, and assume that all behaviour can be explained at this micro-level (Downward, 2007; Gratton & Taylor, 2000: 48). According to this theory, economic agents take rational decisions in a world of complete information to maximise their utility that is determined by a given set of specific tastes and preferences, and restricted by income and time (see also Figure 2.2). Stated differently, these theories try to explain human behaviour through differences in prices and/or incomes (Stigler & Becker, 1977).

2.1.1. Income-leisure trade-of

According to the neoclassical approach, people face a dual-decision dilemma between working and taking part in sports (Downward et al., 2009: 68). As people need money to consume sports participation, they have to earn income. But the more hours they work, the less time that is left for consuming sports participation.

This income-leisure trade-off has interesting implications for analysing sports expenditure. With a rising wage rate, the opportunity cost of time also rises (Downward & Riordan, 2007). Therefore, a 'substitution effect' can be expected, resulting in a shift towards 'work' instead of 'free time', and thus a reduced spending on sports participation. Nevertheless, as for the same amount of hours people earn more income, it seems also logical that a higher wage rate results in higher expenses. In order to find out which of these two contradictory effects prevails, empirical analysis should give further clarification. In most studies the tastes are included through basic sociodemographic (e.g. sex, age) and socioeconomic (e.g. education, profession) variables.

2.1.2. Household production theory (Becker)

In contrast to previous economic theory, the household production theory of Becker (1965) starts from the systematic incorporation of non-working time in economic decisions. The assumption is that all household activities are the result of a utility maximising process that combines time and market goods into the production of household commodities (e.g. food, clothing, sports participation) (Downward & Riordan, 2007; Késenne & Butzen, 1987), given stable preferences that are identical across individuals (Stigler & Becker, 1977). Market goods are thus consumed indirectly through the pursuit of utility maximisation (Stigler & Becker, 1977). The latter is represented by the following utility function:

$$u^*(a) \qquad (1)$$

where *a* stands for the consumption activities, that are also called commodities. These consumption activities are produced by the consumer in the following household production function:

$$a = (q, t_c) \quad (2)$$

where q and t_c respectively represent the goods and time that is needed to produce these activities. By substituting the household production function into the utility function, the following function can be derived:

$$u = u(q, t_c) \quad (3)$$

In maximizing the utility function (3), individuals/households are restricted by both time (4) and income (5):

$$T = t_c + t_w \quad (4)$$

$$p \,.\, q = w \,.\, t_w + y \quad (5)$$

where total time available (T) is the combination of the time spent on consumption (t_c) and the labour time (t_w), and the consumption price (p) of the goods (q) equals the labour income ($w \,.\, t_w$) plus other sources of income (y). After substitution of the time constraint (4) into the goods constraint (5), we obtain the time-income budget that is spent on time and goods:

$$w \,.\, T + y = p \,.\, q + w \,.\, t_c \quad (6)$$

Becker called the left side of equation (6) the full income *m*, the income that could be earned if all time is spent on work. The time-income budget also shows that w not only has an effect on the income that is earned, but that it also represents the opportunity cost (shadow price) of time (Becker, 1965).

From the maximization of the utility function (3) under the above constraints, the demand for goods (q) can be derived that depends on the full income *m* and the wage rate *w* (assuming that the prices are constant):

$$q = q\,(m, w) \quad (7)$$

Taking the total differential of q:

$$dq = q_m .\, dm + q_w \,.\, dw \quad (8)$$

and given that:

$$dm = T \,.\, dw + dy \quad (9)$$

we can derive

$$dq = (q_m \,.\, T + q_w) \,.\, dw + q_m \,.\, dy \quad (10)$$

This demonstrates that the demand can only change if the wage rate (w) or other non-labour income (y) changes. The wage rate has a double effect on demand, as it changes income, but also the shadow price of time.

Because different activities require different inputs of money and time, variation in household production can be expected to depend on the wage rate. Indeed, a wage increase is believed to encourage individuals to shift from time-intensive activities towards expenditure-intensive commodities, and vice versa (Gratton & Taylor, 2000: 55). Because information about the wage rate is often not included,

studies instead often use income (e.g. Downward & Rasciute, 2010; Hallmann & Breuer, 2014; Wicker, Breuer & Pawlowski, 2010), thereby assuming that – on average – the wage rate varies proportionally across different income levels.

2.1.3. Econometric models for consumption analysis

Generally, econometric models assume that sports consumption should be seen as an individual or household that buys n sports goods/services (or produces n commodities), described by the following function:

$q_i=q_i(p_1, p_2, \dots p_j, \dots p_n, I, X)$ $\quad i=1, 2, \dots, n$

where q_i represents the amount of sports goods/products that is demanded, p stands for the price, i for the commodities, I is income, and X are all other sociodemographic, socioeconomic, psychographic… variables. In line with the majority of the sports consumption research, the studies in the current manuscript apply previous sports consumption results and economic theory to estimate the parameters of the above equation and to choose which variables needs to be included.

A limited number of sports studies estimates the 'n equations' by means of a system of demand equations. Examples are the almost ideal demand system (AID), basic translog (BTL), quadratic expenditure system (QES) and quadratic almost ideal demand system (QUAIDS) (Meyer, Yu & Abler, 2011). While for most of these demand functions no applications in the sports consumption literature are found, the AID model has been applied in the sports expenditure studies of Késenne and Butzen (1987) and Løyland and Ringstadt (2009) to calculate sports elasticity values based on budget shares, i.e. income, price and cross-price (substitution) elasticities. The AID model describes the demand system as a set of equations, where the demand for a certain sports activity/good/service depends on the price of that activity/good/service, and of all other activities/goods/services in the market.

Additionally, the SLOTH framework (Cawley, 2004) has been applied in sports literature. SLOTH is an application of Becker's (1965; 1976) household production theory to the sports participation context, and has been extended by Humphreys and Ruseski (2006). SLOTH is an acronym of the time-restriction that economic agents are faced with, and stands for the time that is spent on sleeping (S), leisure (L), paid work (O), transportation (T) and household tasks (H). Leisure consists of both time spent on sports (L_s) and on non-sports activities (L_{ns}). If time and money were limitless, people could combine all possible activities they want. Nevertheless, because all people have 24 hours a day, the time that they spend on sports can be seen as the time that is not spent on other activities (SOTH and L_{ns}). Each of these activities produce utility, that can be positive or negative (Humphreys & Ruseski, 2010). In line with most previous sports expenditure literature, the studies in the current manuscript are not explicitly based on one of the above demand systems, although occasionally the basic principles of the SLOTH framework are used to build the hypotheses (e.g. Chapter 5).

2.2. Heterodox economic theory

The orthodox assumption of rational choice under perfect information has been challenged by studies that can be clustered under the umbrella concept 'heterodox economics'. Scitovsky (1976) for example argues that neoclassical economic demand theory only holds for a partial analysis of consumer behaviour, while Fine (1990) states that the focus on utility maximisation is too narrow and excludes a

multidisciplinary approach. Alternatives for the neoclassical economic theory are grouped in the so-called 'heterodox' economic approaches. Opposite to classic economic approaches, heterodox models also capture insights from other social sciences such as psychology and sociology.

From a psychological point of view, the assumption that preferences and tastes are exogenous, stable and given, is an important source of criticism. Scitovsky (1976) claims that the preferences of individuals are not fixed, and that their choices not exclusively depend on a lack of resources (time and money). Psychological studies provide insight in the reasons why people take part in activities (e.g. sports) that provide little extrinsic rewards (Csikszentmihalyi, 1975). It is for example demonstrated that people fancy activities that do not offer too little or too much arousal, and that pleasure (utility) is the result from the transition of a non-optimal to an optimal level of arousal (Gratton & Taylor, 2000: 61). People thus search for activities that increase their arousal, although not too much, as this would result in 'anxiety'. Scitovsky (1976) explicitly refers to sports participation as a remedy for turning low levels of arousal into optimal levels. Also, by taking part in sports, individuals acquire 'skilled consumption', meaning that the more they consume sports, the more pleasant it will be (Scitovsky, 1976). The term skilled consumption therefore has similar qualities as the learning-by-doing concept (e.g. Downward, 2007; Downward, Lera-López & Rasciute, 2012).

Other psychology-based studies question the orthodox assumption of complete rationality (Cawley, 2004; Earl, 1996; Hosseini, 1990). It is for example found that humans lack the computational capabilities to compare all available information (Lavoie, 2004). Therefore, it seems questionable that a person reacts to all marginal income and price changes, as assumed in the orthodox economic theory. Consequently, economic agents organise consumption hierarchically, meaning that they only consume certain goods/services when this implies that a threshold of satisfaction is reached (Downward, 2007). Lavoie (1994) argues that the latter implies that positive shifts in income probably have a bigger effect on consumption compared to changes in prices, as the latter only ration choice within specific categories of goods.

The Post-Keynesian theories combine the above psychological concepts with the sociological insight that individuals act within a specific social environment, and that their tastes and behaviour is linked to wider social relations (Downward & Riordan, 2007; Downward et al., 2012). Bourdieu (1984) and Veblen (1925) argue that social status and social pressure influence the consumption decision, and that expenses on sports participation reflect social status. People are not islands that live on their own, but are implicitly and explicitly shaped by their social environment. During recent years, more people are noticed to consume both high- and low-status leisure activities, although the elite or 'highbrows' are still more omnivorous. Peterson and Kern (1997) seek to refer to this phenomenon by the 'omnivore-thesis'.

Finally, sociological sports research also emphasises the importance of concrete social situations (Downward, 2004; 2007). People can for example (subconsciously) agree with generally-accepted identities that are formed in the society. A prime example is that certain activities are gendered. Soccer is/was considered a masculine activity in Europe, while in the United States this is/was not exactly true.

The above-listed heterodox theories share the perspective that individual preferences are not stable, fixed or given, but that they are endogenous to the decision-making context (Burgham & Downward, 2005). In this respect, the heterodox economic theory is more dynamic and does not focus solely on prices and

income. From a theoretical point of view, the orthodox assumption that utility maximizing individuals are needed to optimize market efficiency implicitly suggests that sports policy has a negative effect on total welfare, because the market's efficiency is reduced (Downward et al., 2009: 86). Moreover, Downward et al. (2009: 87) argue that also from a practical point of view the heterodox theory is better in providing a rationale for active policy intervention.

In the current manuscript, both the household production theory (Becker, 1965) and heterodox theory are used. Because monetary stimuli are one of the main policy tools of the Flemish sports governing bodies, the assumptions of the household production theory provide in an appealing framework to quantify the effect of changes in income/prices on sports expenditure. Nevertheless, the household production theory is too much of a simplification of the reality to get a deeper understanding 'why' people spend money on sports participation. Therefore, heterodox economic theory is better suited to study the barriers (other than income) that prevent people from spending money on sports participation, thereby theorizing about a rationale for policy intervention.

3. Determining factors of sports expenditure

In the international peer-reviewed journals a number of studies are published since 2000 that investigate the determinants of sports expenditure (i.e. Eakins, 2016; Hallmann & Wicker, 2015; Lera-López & Rapún-Gárate, 2005; 2007; Løyland & Ringstad, 2009; Pawlowski & Breuer, 2011; Scheerder et al., 2011; Wicker et al., 2010; Wicker, Prinz & Weimar, 2013). Table 2.1 gives an overview of the variables that are found to influence both the decision whether or not to spend money on sports, and the amount of money that is spent on sports. Although differences can be found between the studies, most of them indicate that expenditure is positively related to age, being male, income and sports intensity (frequency, years of participation, etc.).

The results also indicate that spending money on sports is a two-part decision. First, different results are obtained when two-part regressions are applied. Pawlowski and Breuer (2011) for example demonstrate that economic agents with a higher income have a bigger chance of spending money on sports, but – once this decision is taken – they spend less money compared to individuals with lower levels of income. Second, when only 'sports participants' are surveyed, the results often differ from other studies. Wicker et al. (2010) for example only include sports club members, and find that female sports club members are the biggest spenders. A possible explanation could be that in these studies only people are included that already decided to spend money on sports, thus in fact only the second part of the two-stage decision is analysed.

A final conclusion based on Table 2.1 is that more research is needed regarding other variable groups than the classic sociodemographic and socioeconomic variables. For example, sports-related variables, motivations and non-sport leisure variables (e.g. watching TV) are not investigated in most studies.

TABLE 2.1

The determining factors of the decision to spend money or not (yes-no, 'I'), and of the amount of money that is spent on sports participation ('II') for studies in peer-reviewed journals since 2000

Source[1]		E, 2016	H&W, 2015	LL&RG, 2005	LL&RG, 2007	L&R, 2009	P&B, 2011	S,V&T, 2011	W,B&P, 2010	W,P&W, 2013
Cat[2]		ALL	GO	ALL	ALL	ALL	MF	SA	SCM	TRI
Sex	I							NS		
	II	+	NS	+	+	+		+	+	NS
Age	I						+	NS		
	II		+	NS	-	-		NS	+-	+
Age Youngest Child	I						NS			
	II	-				-	-			
Married	I						NS			
	II	+					+			
Number of Family Members	I						NS	NS		
	II			NS	NS	-	NS	-		
Urbanisation	I									
	II	-		NS	NS	-	+			
Income	I						+			
	II	+	+	+	+	+	-		+	+
Employment	I									
	II	+		NS	-		NS			
Retirement	I						+			
	II						+			
Available Leisure Time	I									
	II		NS							
Level of Education	I						NS	+		
	II		NS	+	+		NS	+	-	
Sports Participation Frequency	I							+		
	II				+			+		
Sports participation Life Partner	I							+		
	II							NS		
Sports Participation Friends	I							+		
	II							+		
Motivation	I									
	II		+							
Years of Participation	I									+
	II		NS						+-	-
Time Spent on Sports	I									
	II		+						+	+
Level of Performance	I									
	II								+	
Watching Sports on TV	I							NS		
	II							-		

Note '+' = positive significant effect; '-' = negative significant effect; 'NS' = non-significant; blank spots = participation/consumption decision was not investigated

Note[1] E, 2016 = Eakins, 2016; H&W, 2015=Hallman & Wicker, 2015; LL&RG, 2005/2007=Lera-López & Rapún-Gárate, 2005/2007; L&R, 2011=Løyland & Ringstad, 2009; P&B=Pawlowski & Breuer, 2011; S,V&T, 2011=Scheerder et al., 2011; W,B&P, 2010=Wicker et al., 2010; W,P&W, 2013=Wicker et al., 2013

Note[2] ALL=overall sports participation; GO= golf; MF= membership fees; SA=Sports Apparel; SCM=members of sports clubs for different sports activities; TRI=triathlon

4. Rationale of the doctoral thesis

As has been demonstrated in Table 2.1, a significant number of studies use regression methods to investigate the determinants of sports expenditure (e.g. Hallmann & Wicker, 2015; Lera-López & Rapún-Gárate, 2005; 2007; Pawlowski & Breuer, 2011; Scheerder et al., 2011; Weagley & Huh, 2004; Wicker et al., 2010; Wicker et al., 2013). Nevertheless, these studies cope with a number of drawbacks. Some of them were already mentioned in the above sections, while other will be discussed in Chapter 3.

First, the conceptualisation of 'sports expenditure' is often unclear. In previous studies different conceptualisations of sports expenditure are used, such that comparing the results between studies is difficult (see also Chapter 1, Paragraph 2.2.2).

Second, and in line with the previous remark, the majority of the studies focusses on aggregated sports consumption, while certain studies suggest that more research is needed that investigates specific sports activities (e.g. Downward, 2007; Hallmann & Wicker, 2015; Pawlowski & Breuer, 2012b; Wicker et al., 2010) or specific expenditure categories (e.g. Downward et al., 2009: 104; Scheerder et al., 2011; Pawlowski & Breuer, 2012b). Moreover, the scarce non-aggregated expenditure research (e.g. Eakins, 2016; Pawlowski & Breuer, 2012a) is based on non-sports specific expenditure research, and is thereby constrained by the categories that are investigated by the particular surveys (Downward et al., 2009: 105).

Third, the majority of the sports expenditure studies includes only classic sociodemographic (e.g. age, sex) and socioeconomic (e.g. income, education, time) independent variables as suggested by the theory of Becker (1965; 1976), although heterodox theories (e.g. Downward & Rasciute, 2010; Downward & Riordan, 2007; Scheerder et al., 2011) argue that consumption depends on a wider variety of variables such as sports-related and psychographic variables (also called attitudes, interests and opinions or AIO's, see also Chapter 3, Paragraph 3).

Fourth, recent socioeconomic sports literature (e.g. Humphreys & Ruseski, 2010; Scheerder et al., 2011) suggests that normal linear regression methods are not suited to deal with expenditure data, but that zero-regression methods such as Tobit, two-step Heckman and hurdle models are needed to deal with excess zeros (see also Chapter 3, Paragraph 2.1).

Fifth, more research is needed about the magnitude of the (significant) effects of certain economic determinants/barriers. For example, only a few studies (Eakins, 2016; Késenne & Butzen, 1987; Løyland & Ringstad, 2009; Pawlowski & Breuer, 2012a) have focused on income elasticities (see also Chapter 3, Paragraph 2.2).

Sixth, all of the found sports expenditure studies are based on questionnaires. Nevertheless, it has been recognised that survey methods have certain drawbacks, such as non-response because the survey was too time-consuming, or because respondents did not want to answer certain questions, social desirable answers, and recall bias (Bolger, Davis & Rafaeli, 2003) (see also Chapter 3, Paragraph 1).

5. Research questions

By investigating the following research questions, the current research aims to contribute and correct for the drawbacks mentioned in the previous paragraph:

- What are the determining factors of spending money on sports participation? (RQ1)
    - To what extent do the different groups of sociodemographic, socioeconomic, sports-related and psychographic variables contribute to explaining sports expenditure?
    - Is it an added value to investigate separate sports activities and expenditure categories?
- To what extent is income a barrier in consuming sports? (RQ2)
    - Is the income-expenditure relationship significant, and is it a positive (full-income/pure-income) or a negative (substitution) one?
    - What is the magnitude of the income-expenditure relationship (income elasticities)?
- What are the drawbacks of survey research, and how can they be tackled? (RQ3)
    - Which corrections (survey design, zero-regression methods, etc.) can be applied to optimise survey-based research?
    - What is the potential added value of alternative data-collection methods (i.e. observation, diaries) in the field of sports consumption?

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CHAPTER 3
Material and Methods

Now that we know *what* we are going to study, this chapter gives an overview about *how* this will be performed. The different data collection methods (survey, diary and observation) are presented with their advantages and drawbacks (Paragraph 1). Next, it is explained that excess zeros in the datasets ask for zero-regression methods (i.e. Tobit, Heckman, hurdle), based on which income elasticities can be calculated (Paragraph 2). Finally, an overview of the different datasets (Paragraph 3) and studies (Paragraph 4) is provided.

1. Quantitative sports expenditure data collection

As will be explained in the following paragraphs, choosing an adequate data gathering method is essential when studying sports expenditure. Not only has every collection method advantages and disadvantages, it also has important consequences for the sports expenditure results as it – if not properly designed – leads to severe under- or overestimations.

1.1. Surveys

Almost all sports consumption studies use surveys, a data-gathering method that is straightforward to apply (Downward, Lera-López & Rasciute, 2012; Pawlowski & Breuer, 2012b) and has been used in the first five studies of this manuscript (Chapter 4-8). Questionnaires allow for quantifying almost every characteristic and are a manageable tool when a large number of research subjects is targeted (Veal & Darcy, 2014: 133). They are especially useful when only a limited number of answers are possible, thereby allowing for quantification (Veal & Darcy, 2014: 278).

A major disadvantage of surveys is that they provide in self-reported data, meaning that they rely on the capability and willingness of the respondents to recall the requested information (Veal & Darcy, 2014: 133; 280). For example, under- or overreporting could arise because of social desirability on the one hand (Chase & Harada, 1984; Oppenheim, 2000: 138) and because of recall bias on the other hand (Bolger, Davis & Rafaeli, 2003; Pawlowski & Breuer, 2012b; Veal & Darcy, 2014: 281). Another potential problem of surveys is selection bias (Veal & Darcy, 2014: 281), meaning that certain participants are over- or underrepresented in the final dataset.

1.1.1. Respondent-completed versus interviews

Questionnaires can be conducted in a respondent-completed (written, online) format (e.g. Chapter 4, 6, 7 and 8), or orally via interviews (Veal & Darcy, 2014: 133; 282) (e.g. Chapter 5). On the one hand, respondent-completed survey methods take less time for the researcher and are more anonymous. In other words, they are cheaper, and are less subject to social desirability (Bowlin, 2005; Breen, Bull & Walo, 2001). Today, most sports expenditure surveys are distributed through emailing, although it is also possible via manually handing over the questionnaires. A benefit of email is that they can be easily sent to mass email databases, while disadvantages are its low response rates and the potential problem of selection bias (Veal & Darcy, 2014: 290). On the other hand, interviews result in more complete answers and less frivolous responses. Also, in oral interviews more information can be given to the

respondents about for example sports expenditure, meaning that the results can be expected to be more consistent. This also makes it clearer whether missing values in expenditure data should be attributed to zero-expenditure, or because the respondents do not want to give insight in this (personal) information. A drawback of interviews is that they are sensitive for social desirable answers (Breen et al., 2001).

1.1.2. Sports-specific surveys versus non-sports databases

Although the majority of the sports studies (for an overview, see Pawlowski & Breuer, 2012b) use sports-specific surveys for gathering the expenditure data, a significant part is based on published non-sports-specific sources (e.g. Dardis, Soberon-Ferrer & Patro, 1994; Løyland & Ringstad, 2009; Pawlowski & Breuer, 2011; 2012a). This is a relevant difference, as Davies (2002) reports that these published datasets lead to severe underestimations of the actual levels of sports expenditure. It is indeed almost impossible to extract all sports-related data out of the very broad expenditure categories (Davies, 2002; Gratton & Taylor, 2000: 27). Applied to the Flemish data, households spend €234 on sports when based on the published household expenditure database of BeStat (2016), while the sports-specific household dataset of the current doctoral thesis results into an amount of €1525 (Scheerder et al., 2013). Although this big difference can partially be attributed to an underrepresentation of older, smaller and childless families in the former published dataset, the main reason should be situated in the lack of important expenditure categories. For individual expenditure the difference is €146 (BeStat, 2016) versus €352 (Scheerder, Thibaut & Willem, 2015) respectively.

1.1.3. Zero expenditure

A key feature of expenditure data that is closely related – but not restricted – to respondent-completed surveys, is the interpretation of the '0' and 'blank' (i.e. missing value) expenditure responses. What do the respondents mean to say when they answer with one of both options? This is a relevant question, as from a statistical point of view, zeros have a lowering impact on the mean values, opposite to missing values that have no influence.

Different kinds of missing values and zeros can be distinguished (Humphreys, Lee & Soebbing, 2010):

- Zeros can stem from *infrequency of purchase* because a good was not purchased during the sampling period. These zeros are also called non-genuine, as they do not represent actual non-consumption. A bike that was purchased two years ago, will for example not be included in the dataset if the questionnaire asks about sports consumption of the previous year.
- Also, zeros can be genuine non-consumption, and this for two reasons:
    - Because people *abstain* from consumption (i.e. detesting sports)
    - Because the good/service was *too expensive* (i.e. corner solution because of monetary restrictions)

For researchers it is important to adequately interpret the zeros and missing values that arise in the sports expenditure datasets. They not only influence the descriptive statistics, but also the zero-regression that should be preferred (see Chapter 3, Paragraph 2.1). On the one hand, extending the reference period of the survey prevents for infrequency of purchase. On the other hand, a trade-off with recall bias can of course be expected, as it is harder to recall expenses that lie further in the past.

1.2. Diaries

Although in the above it has already been demonstrated that surveys have numerous advantages, certain studies (Bolger, Davies & Rafaeli, 2003; Bowling, 2005; Pawlowski & Breuer, 2012b) pose that survey-based research might be biased. Therefore, the current doctoral thesis not only aims to perform valid survey research, but also explores alternative designs, of which the diary approach is a first application.

A first problem with surveys is that they collect data at one particular point in time, while many of the dependent and independent variables are thought to vary over time (Gratton & Taylor, 2000: 66). Diaries provide in data on a less aggregated level than is the case for classic retrospective surveys. As a result, this not only provides in more detailed data, but also new variables emerge that allow for differentiation *within* research subjects. Second, a common problem with regards to surveying expenditure is recall bias, as these data are hard to remember, date back to a relatively long reference period and normally consist of numerous purchases (Bolger, Davies & Rafaeli, 2003; Breen et al., 2001). Diaries partially correct for this recall bias.

On the other side, diaries are not designed to cope with durable goods, because these are purchased on an infrequent basis. Also, keeping a diary is very labour intensive for the respondent (Hodur & Leistritz, 2006) and for the researcher.

Because of the latter reasons, diaries have not often been used in socioeconomic sports research. Only a few sports expenditure studies are based on overall expenditure databases that are gathered through household budget diary studies (e.g. Eakins, 2016), while no sports-specific diary studies were found. Another explanation why diary methods are avoided is the fact that a significant part of sports consumption is on durable goods. Therefore, a large number of respondents are needed to attain a sufficient dataset, making diary methods a very expensive research tool. A possible solution could be – in line with the sports expenditure study of Scheerder, Vos and Taks (2011) – to differentiate between purchasing and using a sports good. This can be achieved by combining the data gathered through diaries that keep note of the sports apparel usage (and not the purchases), with a detailed survey about the inventory of all sports goods and services that are possessed by the respondent, as has been done in Chapter 10 of this manuscript. By integrating both datasets, researchers can map the purchase price of all sports goods of a respondent (inventory), and how often the sports apparel is used (diary).

1.3. Observation

A second alternative for retrospective surveys is suggested by Annear, Cushman, Gidlow, Keeling, Wilkinson and Hopkins (2014) who argue that observation is an often-neglected datagathering tool in the leisure field. Nevertheless, observation can serve as a natural technique to collect data on sports consumption behaviour, especially given the tsunami of big data that emerge from new information sources (Keller, Koonin & Shipp, 2012; Saunders, Lewis & Thornhill, 2009: 288; Sekaran & Bougie, 2013: 129). Although observation is only applicable to a small part of the sports expenditure research questions, it provides in reliable information in certain specific contexts, especially for commercial sports apparel enterprises. In Chapter 9 of the current thesis a quantitative structured observation is applied on a running event, by using a coding scheme.

The advantages and disadvantages of observation are often opposite to the ones of questionnaires. A first advantage of observation is its unobtrusiveness, meaning that there is no direct contact between the

respondent and the researcher. The research subjects are often not aware that they are observed, such that they consequently do not adapt their behaviour (responses) to meet expectations (Sekaran & Bougie, 2013: 130; Veal & Darcy, 2014: 131). A second advantage is that direct behavioural data are gathered, thereby avoiding interpretation by the respondent (Sekaran & Bougie, 2013: 142). Applied on a sports setting, observation could turn out to be a useful tool, as sports participation takes place in an environment with a lot of 'measurable' data. Observation of sports apparel usage through photographs could lead to interesting insights, as it is believed that 'a picture speaks a thousand words' (Veal & Darcy, 2014: 243; Vos & Scheerder, 2015). Third, by observing sports participants no effort of the research subject is demanded, and non-response is avoided (McKenzie & van der Mars, 2015). Finally, over- and underreporting because of recall bias is corrected for, as researchers do not have to rely on the memory and honesty of the respondents (Breen et al., 2001).

A first disadvantage of observation is the time-invasiveness for the researchers, meaning that observation is an expensive research tool. Although today almost all observational analyses are performed manually, expectations are that this will change in the near future (McKenzie & van der Mars, 2015). A second drawback is that it is hardly possible to observe feelings, moods or thoughts of the respondents (McKenzie, 2009; Saunders et al., 2009: 306; Sekaran & Bougie, 2013: 143). Third, observing sports consumption is only possible in a number of research contexts, such that survey (and diary) methods have a broader applicability. An overview of the strengths and weaknesses of the diary, survey and observation method is provided in Table 3.1.

Table 3.1
Schematic overview of the advantages of the data gathering methods diary, survey and observation

	Diary	Survey	Observation
Time efficiency for respondent	- -	-	+ +
Time efficiency for researcher	-	+	- -
Applicability	+ / -	+ +	- -
Non-aggregated data / level of detail	+ +	+ / -	-
Latent characteristics	+ +	+ +	- -
Objective responses	-	-	+ +
Recall-bias-proof	+	-	+ +
Response rate	- -	-	+ +

2. Regression

2.1. Zero expenditure

The sports expenditure variable often contains excess zeros, as explained in Paragraph 1.1.3. Because the normality assumption of classic regression methods (ordinary least squares or OLS) is violated,

literature (e.g. Amemiya, 1984; Jones, 2000) suggests three econometric variations on OLS to deal with this problem, namely 'classic' Tobit models (used by e.g. Eakins, 2016; Pawlowski & Breuer, 2011), two-step Heckman or sample selection models (e.g. Downward & Riordan, 2007; Pawlowski & Breuer, 2011; Thibaut, Vos & Scheerder, 2014), and hurdle methods (e.g. Humphreys & Ruseski, 2011; 2015).

Zero regression methods consider sports expenditure as a two-part decision process. First, people are faced with a qualitative participation decision (whether a family decides to spend money on sports participation or not), second, they have to make a quantitative consumption decision (the amount of money that they will spend on sports participation) (Pawlowski & Breuer, 2011). Jones (2000) states that the three categories of zero-regression methods attribute the zeros to different theoretical reasons.

The *Tobit* model, also called *standard Tobit model* or *Tobit Type I* (Amemiya, 1984), assumes that the zeros are 'real' zeros, or 'genuine' zeros, meaning that the zeros represent actual levels of non-consumption. The zeros should thus be attributed to families with a positive propensity to consume, but that nevertheless opt not to consume because the cost of sports participation (or a specific sports activity) is too high in relation to the advantages experienced. Consuming zero units is a utility maximizing decision and stems from a typical corner solution (Aristei & Pieroni, 2008; Humphreys, 2013).

The second method is the *two-step Heckman* approach or *Tobit Type II-model* (Heckman, 1979). This approach supposes that the zeros are 'non-genuine', meaning that the zeros do not represent actual zero consumption. According to this method, zeros should be attributed to the fact that the expenditure question is left unanswered (e.g. because the respondent raised issues regarding privacy, length of the questionnaire, time constraints), because the goods are purchased on an infrequent basis and/or because the reference period of the survey was too short (Humphreys et al., 2010; Humphreys & Ruseski, 2015; Jones, 2000). The Heckman method refutes the possibility that economic agents do not take part in sports because of cost. Indeed, people who decide to participate will always be observed to have a positive level of consumption, which is also called first hurdle dominance (Humphreys et al., 2010).

The third category of methods, i.e. *hurdle models*, is appropriate to deal with genuine zeros that stem from corner solutions and/or abstentions (Aristei & Pieroni, 2008). Deliberate abstention occurs when individuals explicitly do not want to spend money on a certain good or service, no matter the price. An obvious example is cigarettes/smoking (Aristei & Pieroni, 2008; Humphreys et al., 2010). The advantage of hurdle models is that the participation and consumption determinants are allowed to differ from each other (Ground & Koch, 2008), which contrasts with the Tobit model that forces the determinants of the participation (yes-no) and the intensity (amount) decision to be the same (Ground & Koch, 2008). Several hurdle models have been suggested and used in the literature, such as the *log normal hurdle model* (Wooldridge, 2010: 536-538) and the *truncated double hurdle model* or *cragg double hurdle* (Aristei & Pieroni, 2008; Cragg, 1971).

Therefore, each study of the current doctoral thesis discusses which zero-regression method is preferred when excess zeros are present in the dataset.

2.2. Elasticities

To understand the magnitude of the income-expenditure relationship income elasticities should be calculated. Income elasticities give the percentage extra sports expenditure in response to a one percent change in income. Løyland and Ringstad (2009) report that in Norway the household demand for sports

evolved from an income elastic good in 1986 to an income inelastic good in 2002. On the contrary, Irish data indicate that even today sports participation should be typified as a luxury good (Eakins, 2016). Based on leisure (sport and non-sport) expenditure data, Weagley and Huh (2004) classify leisure expenditure as a luxury good. The income elasticity values in regression models can be estimated by calculating the magnitude of the effect of the independent variable income on the dependent variables time and money expenditure.

3. Datasets used in this doctoral thesis

It is clear that adequate data gathering is essential when analysing sports expenditure. The first datasets (1-3) of the current doctoral thesis are survey-based and account for the above-mentioned methodological suggestions. By means of these datasets research question 1 and 2 will be investigated. The last two datasets (4-5) draw upon the aim to explore alternative data collection methods, namely an observational and a diary approach, and are used to study research question 3. Table 3.2 gives an overview of the most important characteristics of the datasets, namely the sports activities, name, year, abbreviation, method, the number of respondents, a reference to the first (Dutch) valorisation based on the gathered data, and the research questions that are investigated by means of this dataset.

3.1. Survey data (dataset 1-3)

The survey-based data that are used in the current thesis are the following:

- Dataset 1: The *Flemish Household Study on Sports Participation* (Scheerder, Vandermeerschen, Borgers, Thibaut & Vos, 2013) was carried out in 2009, containing data about 20 expenditure categories for a representative dataset of 3005 households with school-aged children. A strength of this dataset is that also children (<18y) are included, while most sports participation (especially sports expenditure) research only surveys respondents above 12 or 18 years old (Veal & Darcy, 2014: 213).
- Dataset 2: The dataset *Participation Survey Flanders* (Scheerder et al., 2015) stems from a representative sample of 3965 Flemish citizens aged 14 to 85. Oral interviews were taken in 2014. In this study six sports expenditure categories were surveyed, while also questions about other leisure activities were included.
- Dataset 3: The *Leuven Cycling Survey* (Thibaut, Scheerder & Vos, 2011) data were gathered through an internet questionnaire, resulting into a response of 5157 cyclists. Because the focus of this questionnaire is on one sport, the expenditure categories are formulated into more detail when compared with the other 'general' studies. Also, this questionnaire differentiates between fixed costs and variable costs, which is in line with the suggestions of Gratton and Taylor (2000: 51).

3.2. Diary and inventory data (dataset 4)

Diary methods are suited to obtain reliable person-level information because they avoid the perils of retrospection (Bolger, Davis & Rafaeli, 2003; Dixon, Backman, Backman & Norma, 2012). In order to cope with the aforementioned recall-bias problem, a mixed-method has been carried out among runners, with a 30-day-diary on the one hand, and an inventory of the runners' running apparel on the other hand. This resulted in the *Leuven Running Study (Part A)*, a dataset of 196 runners and 2235 running moments.

This dataset contains detailed information about the sports apparel inventory for fifty categories of clothing/footwear/wearables, and the respondents' running habits and apparel usage.

3.3. Observation data (dataset 5)

The *Leuven Running Study (Part B)* dataset is gathered by means of a sports apparel observation analysis on pictures of running event participants (966 runners in total). A number of non-visible characteristics were surveyed via a short questionnaire, completed by 339 respondents (a response rate of 35 percent). Both datasets were combined by means of the race number of the participants, that was observed in the pictures, and asked for in the survey.

TABLE 3.2
Schematic overview of the datasets

Dataset	Sport	Name	Year	Abbreviation	Method	N	First valorisation (Dutch)	Research Question
Nº 1	Overall	Flemish Household Study on Sports Participation	2009	SBV'09	Survey	3005	Scheerder et al., 2013	1&2
Nº 2	Overall	Participation Survey Flanders	2014	PAS'14	Survey (Interview)	3965	Scheerder et al., 2015	1&2
Nº 3	Cycling	Leuven Cycling Survey	2009	LFS'09	Survey	5157	Thibaut et al., 2011	1
Nº 4	Running	Leuven Running Study Part A	2014	LLS'14A	Diary	196	/	1&3
Nº 5	Running	Leuven Running Study Part B	2014	LLS'14B	Observation Survey	966 364	/	1&3

4. Studies of the doctoral thesis

4.1. Overall sports expenditure

The **first** study (see also Table 3.3) investigates the determinants of *family* expenditure on sports participation and has been published in the Sport Management Review (Thibaut et al., 2014). According to Becker (1965; 1976) households are key units in consuming products and services, as individuals take decisions as part of a household. Because the focus is on family expenditure, sports consumption of children is included, which contrasts with most previous literature that studies adults' sports spending. The first study of this doctoral thesis demonstrates that sports consumption consists of two decision processes, more particularly whether or not to spend money on sports participation, and – when one has decided to spend money on sports – the amount of money that is spent. An extensive literature discussion about the three regression methods is presented (Tobit, Heckman, double hurdle).

The **second** study investigates the determinants of *individual* sports expenditure. Special attention is attributed to the income barrier on sports expenditure (and thus sports participation), by calculating the

income-expenditure elasticity at different levels of income, and this for both the decision to spend money on sports, and the amount that is spent. Also, this study includes several non-sports leisure variables, allowing for the analysis of the interconnectivity between sports consumption and other leisure activities.

4.2. Non-aggregated sports expenditure

In contrast with the first two studies, the focus in the third, fourth and fifth study is on non-aggregated sports expenditure. Indeed, a number of studies have indicated that differences exist between the determinants of sports expenditure categories (e.g. Pawlowski & Breuer, 2012a) and different sports activities (e.g. Wicker, Breuer & Pawlowski, 2010).

The **third** study compares the determinants of a number of cost categories with each other. The magnitude of the income effect is researched by calculating income elasticities, such that expenditure categories can compared with each other. First, an extensive literature review is given about the conceptualisation of sports expenditure, demonstrating that almost every study includes other cost categories in what they define as 'sports expenditure'. The study therefore analyses the effects of the determinants on the different cost categories separately. The results show that differences exist in both significance, sign and magnitude of the effects.

The **fourth** study is published online in the Sports Management Review (Thibaut, Eakins, Vos & Scheerder, accepted) and compares the determinants and income elasticities of 13 sports activities with each other, by using both the time and money that is spent on sports as the dependent variable. Because a representative dataset is used, only the most practiced sports activities (and thus few team sports) are included. Significant differences are found between the sports activities. The policy implications discuss to what matter income prevents households from spending money on the different sports activities, and how government can use these results in their policy actions.

The **fifth** study focusses on cycling expenditure, one of the most practiced sports activities, and has been published in the International Journal of Sport Management and Marketing (Thibaut, Vos, Lagae, Van Puyenbroeck & Scheerder, 2016). The study demonstrates that heterodox economic theory and heterodox variables (attitudes, interests and opinions/cycling capital) significantly contribute in explaining cycling expenditure (as suggested by, among others, Downward & Rasciute, 2010), and smooth out the effect of standard 'orthodox' economic variables (e.g. sex, age, education).

4.3. Innovative data-gathering methods

While the first five studies are based on survey methods, the sixth and the seventh explore innovative methods that have rarely been used in the field of sports expenditure. The latter methods cope with certain methodological drawbacks of questionnaires, although this certainly does not mean that diaries and observation can replace survey research. Nevertheless, observation and diaries are interesting for future research because of rapid technological evolutions such as automatic picture recognition and sports tracking smartphone applications. The focus in these two studies is on running, because this is one of the most practiced sports activities, and because this sports is well suited for data-gathering through observation and diaries.

The **sixth** study focusses on information that can be obtained by visual methods, more particularly from pictures taken at running events. It is demonstrated that by using this method valuable information can be obtained. Because of the advantages of this method (no non-response, little time-invasive for the 'respondent', no recall-bias) and the progress in automatic technological scanning methods, the visual method could prove to be an interesting (additional) method for future sports consumption research.

The **seventh** study is based on a combination of diary and inventory data of runners. The diary-based data give a very detailed and profound insight in the habits and expenditure of runners. In contrast to retrospective surveys, information about each training session and/or running event is obtained. Therefore, the answers are less subject to recall bias. Moreover, variables that are normally aggregated when surveyed retrospectively, can be analysed distinguishably and analyse within-person variation (e.g. time spent on a training session).

To summarise, Figure 3.1 presents a schematic overview of the added value of the current doctoral thesis to classic sports expenditure research. This figure gives a visualisation of the differences between the existing sports expenditure research that mostly focusses on the effect of standard socioeconomic variables on aggregated sports expenditure on the one hand, and the innovative aspects of the studies in the current doctoral thesis on the other hand. First, certain variable groups are studied into more detail, more particularly sports-related, psychographic and other income variables. Second, non-aggregated forms of sports expenditure are researched, such as different sports activities and expenditure categories. Third, and in line with recent sports expenditure research, zero-regression methods (Tobit, Heckman, hurdle) are applied. Finally, the current doctoral thesis not only uses surveys to gather expenditure data, but also explores the potential of observation and diary methods.

TABLE 3.3

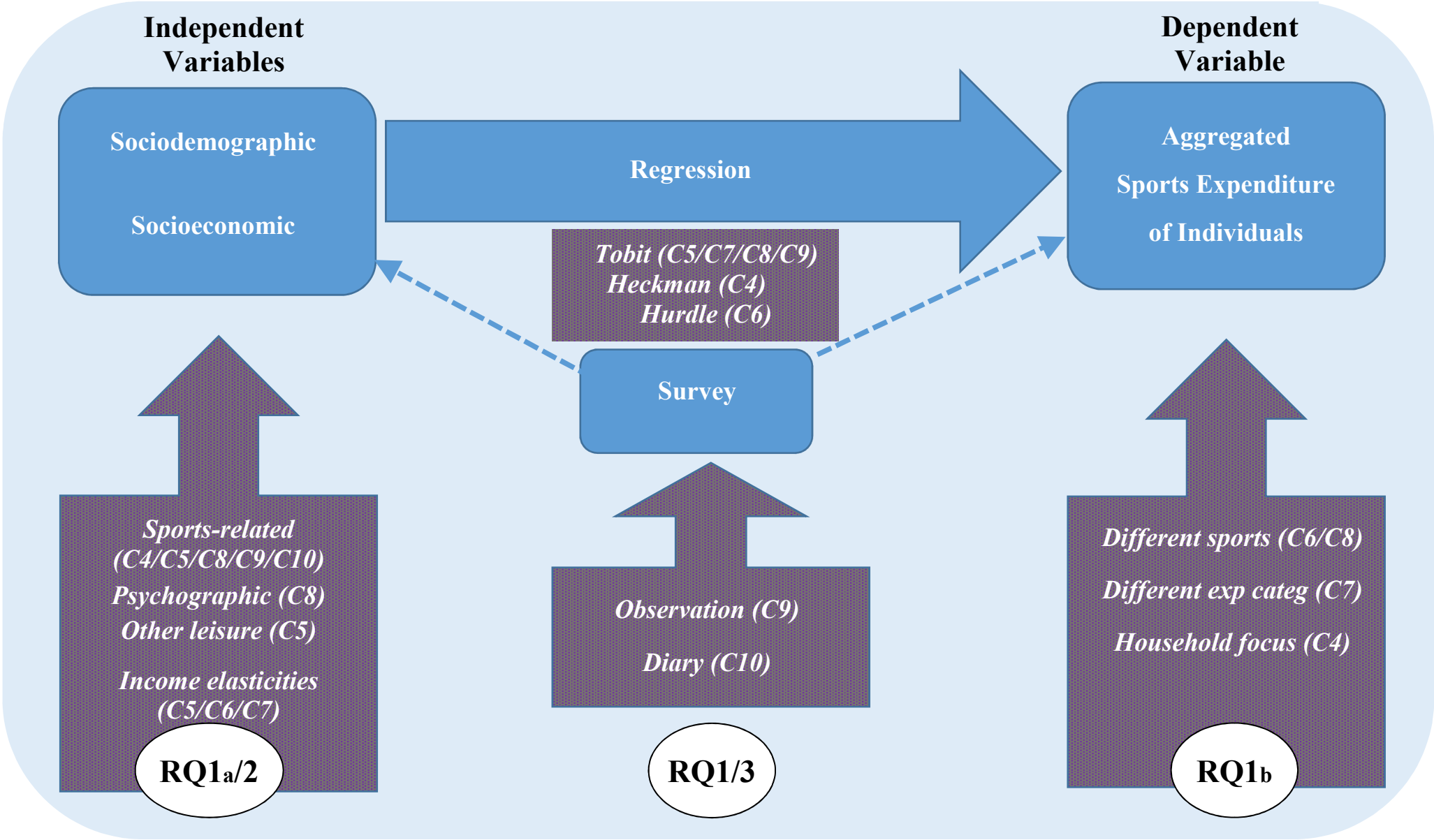
Overview of the studies in the current doctoral thesis (Chapter 4-10), the research topic, data gathering method, economic theory, dataset, journal, and the publication status

Study	Chapter	Topic	Method	Theory	Dataset[1]	Journal[2]	Publication Status
Aggregated expenditure							
Hurdles for sports consumption? The determining factors of household sports expenditure (Paper 1)	4	Household expenditure	Heckman	Becker	SBV'09	SMR	Published
Financial barriers to practice sports: The dynamics of the income-expenditure relation (Paper 2)	5	Individual expenditure	Tobit	Heterodox	PAS'14	LS	Submitted
Non-aggregated							
The determinants and income elasticities of 12 sports expenditure categories (Paper 3)	6	Income elasticities of expenditure categories	Hurdle	Becker	SBV'09	ESMQ	Submitted
Time and money expenditure in sports participation: The role of income in consuming the most practiced sports activities in Flanders (Paper 4)	7	Income elasticities of sports activities	Tobit	Becker	SBV'09	SMR	Published
Partaking in cycling, at what cost? Determinants of cycling expenses (Paper 5)	8	Expenditure on cycling	Tobit	Heterodox	LFS'09	IJSMM	Published
Innovative data-gathering methods							
The purchase price of runners' sports apparel: Combining observational and survey data at running events (Paper 6)	9	Running event expenditure	OLS/Tobit	Heterodox	LLS'14A	JSF	Submitted
Running apparel consumption explained: A diary approach (Paper 7)	10	Running expenditure	Fixed effect linear model Between effect linear model	Heterodox	LLS'14B	AE	Submitted

[1]The abbreviations of the datasets can be found in Table 3.2

[2]SMR = Sport Management review, LS= Leisure Studies, ESMQ= European Sport Management Quarterly, IJSMM = International Journal of Sport Management and Marketing, JSF = Journal of Sport Finance, AE = Applied Economics

FIGURE 3.1
Schematic overview of classic sports expenditure research (above), with the contributions of this doctoral thesis per chapter (C) and per research question (RQ) (below)



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SECTION 2

TOTAL EXPENDITURE ON SPORT

CHAPTER 4
Hurdles for Sports Consumption? The Determining Factors of Household Sports Expenditure (Paper 1)

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Thibaut, E., Vos, S., & Scheerder, J. (2014). Hurdles for sports consumption? The determining factors of household sports expenditure. *Sport Management Review, 17*(4), 444-454.

1. Abstract

The purpose of this article is to explore the determining factors of household expenditures on sports participation. Due to a relatively large amount of zero-expenditures, simple regression methods are not suited. Because of methodological reasons, the two-step Heckman approach is used over the Tobit approach and the Double Hurdle approach. The participation decision (spend money or not) is influenced by sports participation of the parents, family income, education, sports club membership, and sports frequency. Determining factors of the intensity decision (amount of money that is spent on sports participation) are family income, sports participation of parents during their youth, sports club membership, sports frequency, age of youngest child, and household size. Moreover, the results indicate that a two-stage approach is needed because it gives a more in-depth insight in the household spending behavior. For example, higher educated households more often spend money on sports participation. However, this research demonstrates that once higher educated households have decided to spend money on sports participation, the amount of money spent does not differ from lower educated households.

2. Introduction

Until the 1970s, the social and economic importance of sports participation can be considered as relatively low (Lera-López & Rapún-Gárate, 2005). In the last forty years the number of sports participants has grown extensively, and a lot of companies have reacted to this evolution by providing sports goods and services to this booming market, in both developed and emerging countries (Andreff & Andreff, 2009). Nowadays, the sports sector contributes significantly to the economic welfare in Western countries. Literature shows that consumer expenditure on sports participation accounts for a relative important and growing share of the economy (e.g. Andreff & Andreff, 2009; Bloom, Grant, & Watt, 2005; Davies, 2002; Milano & Chelladurai, 2011; Taks & Késenne, 2000; Scheerder & Vos, 2011). Andreff and Andreff (2009) demonstrate that between 0.5% and 1% of total global imports and exports consists of sporting goods. In our paper, the research context is Flanders[2]. More particularly,

[2] Flanders is the Dutch speaking part of Belgium. Policy of sports is attributed to the three communities of Belgium, of which Flanders is the major one.

this paper will focus on the household sports expenditure of Flemish families. With regard to Flanders, Taks and Késenne (2000) revealed that 6.8 % of the total household expenditure consisted of expenditures on sports participation, which narrows down to 2.8% when indirect costs such as social costs and travel expenditure are excluded. In the ten years following this study, sports participation amongst 12-75 year-old Flemish inhabitants has increased from 56.8 percent in 1999 to 64.3 in 2009 (Scheerder, Vandermeerschen, Borgers, Thibaut, & Vos, 2013). Therefore, one could expect that in this period the expenditures on sports participation have also increased. Generally, the above mentioned studies conclude that between 1.5% and 3.0% of consumer spending is on sports participation, and that expenditure on sports participation contributes to a significant part of the global industry.

Based upon their data, Taks and Késenne (2000) demonstrate that in Flanders, household expenditure on sports participation is five times larger than household expenditure on spectator sports. Despite the growing literature that focuses on mass participation in sports (as shown by Downward & Rasciute, 2010), Lera-López and Rapún-Gárate (2005) argue that North-American scholars still mainly focus on spectator sports. The present study aims to contribute to the growing literature in the field of the economics of mass sports participation.

The major part of the studies that examined the influencing factors of sports consumption, focused on expenses of individuals (e.g. Lera-López & Rapún-Gárate, 2005, 2007; Scheerder et al., 2011; Wicker et al., 2010). Some of these studies indicate that household features, like household size or family income, are significant contributors in describing sports expenses (e.g. Lera-López & Rapún-Gárate, 2005; Scheerder et al., 2011). Despite the significant results of household characteristics, household studies seem to be very scarce. Yet, literature states that families are responsible for a sizeable part of economic activity (Becker, 1981). Indeed, families produce much of the consumption, education, health and other human capital of their members. Altruism is recognized to be an important factor in families, in contrast to market transactions where selfishness is common. This also accounts for expenditure on sports participation: in most cases it is the parents who decide which goods are bought and how much of the family income is spent on them. In other words, individuals take decisions as part of a household (Downward & Riordan, 2007). By focusing on the expenditure of households, this study will fill this gap in sports literature.

In general, this study aims to analyze the determining factors of household sports consumption. To analyze this, regression methods which were developed to deal with zero expenditure will be used. In the next section, an overview of theories and empirical literature is provided in order to identify relevant background variables of sports consumption. Next, we will focus on the methodology that has been used in obtaining and analyzing the data. Finally, a summary of the most important results, conclusions and implications is presented.

3. Review of literature

3.1. Theoretical approach

A number of theories have been used to explore the variables which influence (expenditure on) sports participation (Downward & Rasciute, 2010). Each of these theories suggests particular variables in order to explain (expenditure on) sports participation. Downward and Rasciute (2010) distinguish two main categories of theories: neoclassical approaches, and heterodox approaches. The neoclassical, orthodox

approaches should be situated in classical economic demand theory, which states that the demand for sports is a function of its price, the price of other goods (complements and substitutes), income, and preferences (Scheerder et al., 2011). On the contrary, the heterodox perspective uses different methodological assumptions than classical economic demand theory (Downward, 2007).

The neoclassical, orthodox approaches assume that individuals are perfectly informed rational agents who want to maximize their satisfaction (also called perceived utility), by consuming goods and services, given certain constraints (mainly disposable income and time). People face an income-leisure trade-off: they earn money by producing (working), money they need in order to consume leisure. In other words, the more someone works, the more money this person earns[3] to spend on leisure goods and services, but the less leisure time this person has left in which the money can be spent (Downward & Riordan, 2007; Scheerder et al., 2011). An example of an orthodox approach is the household production theory of Becker (1965, 1981). This theory states that agents maximize their welfare, subject to the constraints of time, income and information (Downward & Riordan, 2007; Weagley & Huh, 2004). Agents use the resources time and capital to transform market intermediate goods into final consumption commodities such as food, clothing, and sports participation in order to satisfy their needs, respectively hunger, warmth and recreation (Ironmonger, 2001). In other words, families invest time and goods in order to provide the greatest return for the household. This can be achieved in two possible ways: by directly 'consuming' sports participation, or by acquiring human capital (skills and capabilities) that helps the household to 'consume' sports participation more efficiently. Human capital can be achieved by means of education and practice. People with high degrees have been exposed more years to physical education and are supposed to have acquired higher levels of sports skills (Wicker et al., 2010). The same holds true for people who have participated more in sports in the past. The expertise that they have gained while practicing sports, is supposed to have improved the efficiency of consuming sports participation while facing monetary and time restrictions. In conclusion, the household production theory assumes that household production depends on the resources income and time, and human capital. Becker's theory has been popular in explaining (expenditure on) sports participation (e.g. Downward & Riordan, 2007; Pawlowski, Breuer, Wicker, & Poupaux, 2009), and has been extended by Wicker et al. (2010). While traditional theories state that the time used to produce and consume basic commodities represents the time not working (Humphreys & Ruseski, 2006), Wicker et al. (2010) modified the factor (disposable) time into time involvement in sports (i.e. intensity of sports participation).

The second category consists of the heterodox approaches, theories that are based on wider social scientific literature. The heterodox theories assume that consumption does not only depend on the price of the good, but also on the subjective feelings of the consumer, and that social interactions and lifestyle affect expenditure on sports participation. These theories suggest that lifestyle characteristics and sociodemographic variables should be included in order to explain expenditure on sports participation (Downward, 2007; Lera-López & Rapún-Gárate, 2011; Scheerder et al., 2011). The heterodox

3 As argued by the PhD commission, the household production theory focusses on wage rate instead of income. Because information about the wage rate is often not included, studies instead often use income (e.g. Downward & Rasciute, 2010; Hallmann & Breuer, 2014; Wicker, Breuer & Pawlowski, 2010), thereby assuming that – on average – the wage rate varies proportionally across different income levels.

approaches also emphasize that a complex reality is managed into a relatively small amount of subsets that can be hierarchically ordered (Downward, 2004).

The heterodox approaches consist of three main theoretical perspectives. First, the psychological approach mainly focuses on individual constraints on sports participation. Concerning this theory, sports participation choices are influenced by feelings (anxiety, sensation-seeking, pleasure) which are experienced while practicing sports. For example, Kang, Bagozzi, and Oh (2011) state that emotion can be a key determinant in human behavior in general. They demonstrate that emotions and attitudes are antecedents of (expenditure on) sports participation. Second, according to the post-Keynesian approach, individual choices are influenced by social relations, social classes and social values, such as family and friends. This phenomenon is related to both learning by doing and spillover effects. An example is the theory of Bourdieu (1979) that suggests that individual preferences are shaped by social values. In this way, social classes distinguish themselves from other social classes. Third, the sociological approach assumes that individual behavior is influenced by the construction of social identities. Habitus and social pressure (e.g. soccer is a male activity) are supposed to play an important role in explaining (expenditure on) sports participation (Downward, 2007).

In sports literature, all of the above-mentioned theories have been used in explaining (expenditure on) sports participation (for an overview, see Downward & Rasciute, 2010). The core of our model is based on the household production theory of Becker. First of all, the research question focusses on household expenditure. Because families have the possibility to choose between measurable amounts of money, we prefer to use a more traditional economic theory. With regard to (the level of) sports participation, some authors (e.g. Downward, 2007) argue that decision makers hierarchically order the complex reality into manageable subsets, for example because of bounded rationality. Although we do not question this conclusion, we believe that when analyzing expenditure (on sports participation), that the decision makers (parents) use rational decisions to acquire the goods and services at the most reasonable price while maximizing the family utility of sports participation. Second, the household production theory of Becker is suited to deal with family data. After all, it is Becker that put the family on the economics research agenda (Pollak, 2003). Third, when analyzing families, it is not easy to gather information about family preferences, while on the contrary (rather fixed) descriptive family data are more accessible (e.g. number of parents, sex of the head of household, family income). So, we will focus on the variables that are suggested by the household production theory, namely time (intensity of sports participation), family income and human capital. Human capital is often represented by means of education (in this paper we call it social human capital). This is because people with higher levels of education are supposed to have been more exposed to physical education (Wicker, Breuer, & Pawlowski, 2009), and because they are more aware of the potential benefits of sports participation (Wicker et al., 2010). Families in which the parents practiced sports during their youth are supposed to have more (sports specific) human capital compared to families with parents that were not sports active. In order to explain (expenditure on) sports participation authors expanded the factors of the household production theory (income, time, human capital) with other theoretical factors (restrictions), for example age (e.g. Humphreys & Ruseski, 2006; Wicker et al., 2009, 2010), gender (e.g. Humphreys & Ruseski, 2006; Wicker et al., 2009, 2010), marital status (e.g. Humphreys & Ruseski, 2006), number of children (e.g. Humphreys & Ruseski, 2006), residence (e.g. Wicker et al., 2009), and time participating in sports (e.g. Humphreys & Ruseski, 2006; Wicker et al., 2010).

3.2. Determinants of sports consumption

The primary focus of this section is to formulate hypotheses with regard to household expenditure on sports participation. The hypotheses will be based on the above-mentioned theories, and on the results of previous research.

As far as we know, only one study focused on determinants of *household* expenditure on sports participation (Pawlowski & Breuer, 2011). This study analyzed the influence of different sociodemographic (age of head of household, having children, race, household size) and economic (income, level of education) characteristics on the recreational expenditure that people make. Pawlowski and Breuer (2011) focused on expenditure shares of seven Sports and Recreational Services (SAR services), of which six were sports-related activities (swimming pools, dancing lessons, fitness studios, ski lift fees, sports events, and sports club membership fees), and one non-sport activity (music lessons). Based upon the results of the study of Pawlowski and Breuer (2011), and by extension studies that focus on leisure activities in general (e.g. Weagley & Huh, 2004), we can formulate hypotheses with regard to *household* expenditure on sports participation.

Because of the rather small amount of household expenditure studies in the field of sports, expenditure studies on the *individual* level are also considered (e.g. Lera-López & Rapún-Gárate, 2005, 2007; Scheerder et al., 2011). These studies supply additional information because they give a more in-depth insight in the influence of sociodemographic and economic variables on expenditure behavior. Moreover, these studies also take other characteristics into account, like for example a number of sports-specific characteristics. The study of Downward (2007) deserves mention – although it analyzes *individual* spending on sports participation in general and on eight sports disciplines – it is based on the UK 2002 General Household Survey and thereby contains a lot of family data.

The household production theory states that expenditure rises with income, capital, and time. Higher income provides households with money for consumption, such that higher levels of utility can be achieved. Because sports can be considered as a normal good, we expect that when household income rises, households will spend more money on sports participation. In the literature, household expenditure on recreational activities was found to increase with household income (e.g. Dardis, Soberon-Ferrer, & Patro, 1994; Weagley & Huh, 2004). On the individual level, most studies find positive relationships between income and consumption on sports participation (Bloom et al., 2005; Downward, 2007; Jones, 1989; Lamb, Asturias, Roberts, & Brodie, 1992; Lera-López & Rapún-Gárate, 2007; Taks, Renson & Vanreusel, 1995, 1999). Therefore, we expect the following:

H1. Households with a higher income level spend more (often) money on sports participation.

The second variable, as suggested by the household production theory, is human capital, often represented by education. People who have been enrolled in the school system for a longer period of time, have consequently been exposed to mandatory physical education, and have had more access to sports infrastructure and peer sports companions (direct effect). Moreover, one could expect that higher educated people are more aware of the benefits of sports participation (indirect effect). Therefore, one would expect that the higher the education, the higher expenditure on sports participation. Families with a higher educated head of household were found to spend more money on recreational activities (e.g. Dardis et al., 1994; Weagley & Huh, 2004). Also on the individual level, literature shows that people

with a higher level of education spend more money on sports participation (Downward, 2007; Downward & Riordan, 2007; Lera-López & Rapún-Gárate, 2005, 2007; Scheerder et al., 2011; Wicker et al, 2010), while Taks, Renson, and Vanreusel (1999) found that lower-educated people spend more money on sports participation. The following hypothesis can be formulated:

H2a. Households with a high-educated head of household (socioeconomic capital) spend more (often) money on sports participation.

Apart from education, the variable 'sports participation of the parents during youth' can be seen as a second proxy for the human capital of the family. Indeed, if parents practiced sports during their childhood or adolescence, they can be expected to have learned how to practice sports, maybe even in a more intensive way than through mandatory physical education. This can be considered as active sports knowledge in which the parents invested during their youth, which they want to continue for themselves, and which they want to pass on to their children. The above results in the next hypothesis:

H2b. Households with parents who were sports active during their youth (sports-specific capital), spend more (often) money on sports participation.

The third factor of the household production theory is time involvement in sports participation. On the one hand, one would suppose that the more time someone spends on sports participation, the more money these people will spend while practicing sport because they have to pay more entrance fees, because their sports apparel wears down, etc. On the other hand, the time allocation theory of Becker (1965) poses that for people with high income, time is more valuable. Therefore, people with a higher income will choose for expensive sports which do not take much time. A large amount of studies on individuals report that people with a higher level of sports participation, spend more money on sports participation (Taks, Renson, & Vanreusel, 1995). Also the sports intensity seems to positively influence the amount of money that is spent on sports participation (Scheerder et al., 2011; Wicker et al., 2010). Sports club members are also found to have higher sport expenses compared to non-sports club members (Taks et al., 1999). Based upon the household production theory and the results of previous research, we can therefore formulate the following hypotheses:

H3a. Households that participate more frequently in sports spend more (often) money on sports participation.

H3b. Households with a large proportion of sports club members spend more (often) money on sports participation.

Apart from the variables suggested by the household production theory, other variables are found to influence expenditure on sports participation. Some of these variables can be clustered into sociodemographic variables. First, according to Taks et al. (1999) and Bloom et al. (2005), families with more children spend more money on sport participation. Lera-López and Rapún-Gárate (2005, 2007) found no significant relationship. Scheerder et al. (2011) found a small but negative relationship between family size and individual expenditure on sports participation. In other words, if a household counts more members, the household is supposed to spend more money on sports participation, but the expenditure per family member is expected to decline. Second, the age of the head of household has a negative effect on household expenditure on recreational activities (Dardis et al., 1994), while Pawlowski and Breuer (2011) found no significant relationship for most SAR services. On the individual

level, the relationship between sports consumption and age is not clear. A number of studies show that old people spend more money on sports participation (Lamb et al., 1992; Oga, 1998; Taks et al., 1999). Other studies report that young people are the biggest spenders (Lera-López & Rapún-Gárate, 2007), while other studies do not find a clear significant relationship (Lera-López & Rapún-Gárate, 2005; Scheerder et al., 2011). Overall, with regard to grown-ups we expect to find a negative relationship between age of the head of household and household expenditure. Third, having a child younger than six years lowers the probability of spending on sports participation, and the amount that is spent (Downward, 2007; Pawlowski & Breuer, 2011). This is due to the fact that parents have to take care of these children, which makes it harder for the parents to practice sports. Second, as younger children are likely to spend less money in general, we expect this to hold true for sports participation expenditures as well. Fourth, in line with the latter, we expect that households with two parents have more time to practice sports, and thereby we expect them to have higher sports participation expenses. Fifth, regional differences in sports participation exist (e.g. Downward, 2007). People who live in rural areas are supposed to spend less money on recreational activities in general (Weagley & Huh, 2004) and on sport and recreational services (SAR-activities) (Pawlowski & Breuer, 2011). With regard to specific activities, Pawlowski and Breuer (2011) found that people in bigger cities spend more money on swimming pools, dancing lessons, sports events, fitness studios and sports club membership fees. These findings can be translated into the following hypotheses:

H4a. The more members the family counts, the lower the average expenditure per family member, and the less often they spend money on sports participation

H4b. Households with an older head of household spend less (often) money on sports participation.

H4c. Households with a child younger than six years spend less (often) money on sports participation.

H4d. Households with two parents spend more (often) money on sports participation.

H4e. People who live in rural areas spend less (often) money on sports participation

4. Method

In the present study, parents were asked to fill out the questionnaire together with their children. In our opinion, this approach gives the best results to learn about the expenditure that children make, and/or the expenditure that parents make for their children.

4.1. Data

The data used in this study are drawn from a cross-sectional sample of households in Flanders. The questionnaire, based on a similar questionnaire of Taks and Késenne (2000), was distributed in the spring of 2009 to a representative sample of school-aged children (6-18 years old) via schools in Flanders. This is because in Flanders, the compulsory school attendance is for children aged 6 till 18. The children were asked to give the questionnaires to their parent(s). The parents were asked to fill out the questionnaire for every family member, namely the father, mother, the child that brought the questionnaire, and other sons or daughters that are part of the family. Through this method we were able to gather information about a representative sample of Flemish families with school-aged children (6-18 years old). In total 4500 questionnaires were distributed, resulting in a response of 3005 households

that participated in this study (response rate of 68 percent). A standardized questionnaire asked the Flemish families about their sports participation habits, expenditure on sports participation and different socioeconomic and demographic characteristics of the family members. The inter- and intra-tester reliability of the questionnaire were found to be adequate (Scheerder et al., 2013).

In order to analyze household expenditure on sports participation, a consumer questionnaire is preferable over an existing, published dataset of general household expenditures (Davies, 2002). This is because consumer questionnaires allow gathering of detailed information about spending behavior, contrary to published datasets that are based on broad questionnaires and thereby also account for non-sports expenditures. By means of a sports specific consumer questionnaire, we were able to ask for sports-related expenditure categories and other (sports) variables, which would be impossible by means of general household expenditure datasets. In the next section we will explain the variables that have been used in our study.

4.2. Variables

The dependent variable that is used in this study, is the household expenditure on active sports participation during the last twelve months. The definition of the dependent variable is based on a broad approach of sport participation expenditure, as both direct and indirect costs related to sports participation are included. Households were asked to note down their expenditure in the following cost categories: membership & entrance fees (membership fees, permits, once-only grants, registration fees for tournaments/competitions, entrance fees), training expenditure (fee for lessons, training camps, sports holidays), sports apparel expenditure (purchase of clothing, shoes, equipment, rent of apparel/equipment), travel expenditure (car, public transportation), socializing expenditure (refreshments, socializing events), health expenditure (medical costs, body care, insurance) and finally additional expenditure (child care, other). The different cost categories are summarized, divided by the number of family members, and summed up with '1'. Next, the natural logarithm is taken to correct for the skewed distribution. Table 4.1 gives an overview of the descriptive statistics of the dependent and the independent variables that have been included in this study.

4.3. Model specification

The key feature of analyzing expenditure on sports participation, is that expenditure data usually contain a relative large number of zero observations (Pawlowski & Breuer, 2011). The dataset that is used in this study contains 16.4 percent zero observations, which means that for 16.4 percent of the households, no expenditure was found in the dataset. The presence of zero observations causes the data to be left-censored, which violates the normality assumption of ordinary least squares (OLS) regression. A number of methods are used to cope with left censored data (Cragg, 1971). Literature groups these methods into three main categories, namely Tobit, two-step Heckman, Double Hurdle (e.g. Humphreys, Lee, & Soebbing, 2010; Pawlowski & Breuer, 2011). These methods consider a two-part economic decision process. First, people are faced with a qualitative, participation decision (whether a family decides to spend money on sports participation or not), second, they have to make a quantitative, consumption decision (the amount of money spent on sports participation) (Pawlowski & Breuer, 2011). The choice between these three methods depends on the reason why (one would expect that) zeros are observed, which is by their turn narrowly associated with the econometric properties of the method. However, literature is not always unanimous about which method suits each situation best, and the differentiation

between the three models is not completely clear-cut. Therefore, we will describe the differences between the three methods, while referring extensively to literature.

TABLE 4.1
Descriptive statistics of the dichotomous dependent variable and the independent variables

Variable	Description and measurement
Decision of the family to spend money on sports participation	*No* (16.4%), *yes* (83.6%)
Number of parents	*1 parent* (14.8%), *2 parents* (85.2%)
Age youngest child	*≤6 yrs* (18.5%), *>6 yrs* (81.5%)
Sports participation parent(s) during their youth	*Yes* (81.2%), *no* (18.8%)
Education head of household	*Primary* (20.8%), *secondary* (32.9%), *higher education* (46.3%)
Family income	*Low* (33.6%), *moderate* (32.3%), *high* (34.1%)
Sports participation parent(s)	*Yes* (76.6%), *No* (23.4%)
Age head of household	*≤ 40 yrs* (18.9%), *41-50 yrs* (65.1%), *> 50 yrs* (16.0%)
Socioeconomic type of residence	*Central municipality* (32.3), *concentric economic activity* (14.8%), *rural* (15.9%), *semi-urbanized* (13.6%), *urbanized* (2.6%), *touristic* (3.1%), *municipality* (17.6%)
Proportion of households that is sports club member	*Low* (50.2%), *moderate* (29.8%), *high* (20.0%)
Sports participation frequency of household	*Low* (32.5%), *moderate* (33.2%), *high* (34.3%)
Household size	*≤ 3 members* (21.3%), *4 members* (45.2%), *5 members* (22.3%), *≥ 6 members* (11.1%)

The first method is the Tobit model (Tobin, 1958). The Tobit model takes for granted that zeros are the result of people who do not consume because of corner solutions (Humphreys, 2010; Jones, 2000; Pawlowski & Breuer, 2011). In other words, people do not participate not because they detest sports, but because the price of the good is too high in relation to the utility experienced by consuming the good (Humphreys et al., 2010) and/or in relation to their constrained budget (Aristei & Pieroni, 2008). This would imply all non-spenders would spend money on sports participation if the price was low enough (Humphreys et al., 2010). Because our dataset contains expenses of all family members on all possible sports, it seems to be very unlikely that every member of the family would not participate in any sports because the price is too high. In other words, almost for every expensive sport or sports product, there exists a cheap(er) alternative. Moreover, research has shown that expenditure on sports participation is not a matter of price, but a matter of taste (e.g. Taks et al., 1995). Another reason why the Tobit model is not suited for this study, is the restrictiveness of the Tobit model because it assumes that the determinants of consumption and participation are the same (Humphreys et al., 2010; Pawlowski & Breuer, 2011). Weagley and Huh (2004) state that for this reason, single-equation models are inappropriate to model leisure expenditure.

Two-stage estimators can be used to overcome this last mentioned restriction. There are two broad categories of methods that can be used. On the one hand we could use the Double Hurdle approach, on the other hand we could also use the Heckman approach (Heckman, 1974). Both methods explore the decision whether or not to spend money, and the allocated expenditure share separately. In the double-hurdle model (Cragg, 1971), zeros can be attributed to both corner solutions (intensity decision) and

deliberate abstentions (participation decision) (e.g. Aristei & Pieroni, 2008; Humphreys et al., 2010; Wodajo, 2007). Deliberate abstention means that agents would never spend money on sports participation under any circumstance or at any price (Humphreys et al., 2010). The Cragg Double Hurdle approach allows the determinants to differ. This is why the double-hurdle model – in contrast to the Tobit and two-step Heckman approach – treats the participation and intensity decision completely separately. So, the double-hurdle model adds the possibility that households consume without spending (practicing sport without spending money), or spend without consuming (spend money on sport, without practicing sport). This means that the decision to participate and the decision about the amount of money that is spent are treated completely separately. Given the latter, Cragg (1971) originally developed the double-hurdle approach in the context of durable goods. The double-hurdle approach is often used to deal with durable goods that are purchased infrequently (Pawlowski and Breuer, 2011; Yen, 1993), since expenses on durable goods in a certain time frame do not necessary involve consumption in the same time period.

The two-step Heckman approach focuses on the participation decision (which is also called first hurdle dominance) by assuming that there will be no zero-observations in the second stage (intensity decision) once the first-stage selection (participation decision) is passed (Wodajo, 2007). In other words, once people decided (not) to spend money on sports participation, we will notice that they are always (never) spending money on sports participation under any circumstances (Garcia & Labeaga, 1996; Humphreys et al., 2010). Zeros are attributed to self-selection, which means that zeros come from deliberate choices of the respondents not to participate (Wodajo, 2007), for example because of abstention. The decision not to participate because of cost is explicitly ruled out (Humphreys et al., 2010). Finally, the two-step Heckman model is supposed to deal best with zeros because of non-response (Amemiya, 1984; Humphreys, 2010). Indeed, it is possible that someone spent money on sports participation, but that he or she did not mention the amount he or she spent. A possible reason for this is that respondents withdraw from filling out the questionnaire because of the length of the questionnaire.

With regard to our specific sports expenditure data, the Heckman approach is more appropriate compared to the Double Hurdle approach. First of all, because of the operationalization of the dependent variable, all people who participate will be seen spending money. Indeed, the participation decision is directly calculated from the amount of money that is spent. Once people answered that they have spent more than zero euros on sports participation during the last year, they were supposed to score ‘yes’ on the question whether they spent money on sports participation. In conclusion, the operationalization of the dependent variable influences the choice between the Heckman approach and the Double Hurdle approach in favor of the first one (Garcia & Labeaga, 1996; Humphreys et al., 2010). Second, the Double Hurdle model is often used in explaining infrequent purchase (Pawlowski and Breuer, 2011; Yen, 1993). It is very unlikely that the zeros in our dataset are due to infrequent purchase, because total expenditure is the result of the sum of the expenditures of the family members during one whole year on a lot of cost categories (not only durable goods like sports apparel, but also services and non-durable goods), making it implausible that the zeros are the result of infrequent purchase. The third argument is partially based upon the second one. In our opinion, the major part of the zeros is due to missing or non-response. The two-step Heckman model is suited to deal with that kind of zeros and will be used in this study (Amemiya, 1984; Humphreys, 2010). To check our preference for the two-step Heckman analysis, we

carried out the same analysis by means of the Tobit model and the Double Hurdle approach. In the results section we will demonstrate that our choice for the two-step Heckman analysis is legitimate.

Next, we will have a closer look at the two-step Heckman approach. In the first equation the inverse Mill's ratio or hazard rate is calculated by applying OLS to the whole dataset. The inverse Mill's ratio is calculated by multiplying rho (correlation coefficient between the error terms from the selection and outcome equation) and sigma (adjusted standard error of the outcome equation). In the second step the inverse Mill's ratio is used as an explanatory variable in the OLS estimation of the uncensored observations (Pawlowski & Breuer, 2011). In two-stage models the variables of the first and second stage are allowed to differ. Some scholars state that it is recommended that the selection equation contains an exclusion restriction, which means that the selection equation must be identified by means of (a) variable(s) that is (are) not incorporated in the outcome equation (e.g. Bushway, Johnson, & Slocum, 2007; Humphreys & Ruseski, 2006; Pawlowski & Breuer, 2011; Sartori, 2003). Incorporating an exclusion restriction on the second equation (also called instrumental variable) reduces multicollinearity and the correlation of the inverse Mill's with the explanatory variables of the second equation (Bushway et al., 2007; Pawlowski & Breuer, 2011). So, adding an (appropriate) instrumental variable reduces the chance of rho (correlation between coefficients of the selection equation and the outcome equation) being equal to zero. This proves to be useful, because some authors suggest that the two-step Heckman is not appropriate if rho is equal to zero. The variable 'sports participation by parents' is selected to be the instrumental variable because of two reasons. First, we expect that the decision whether or not to participate in sports influences the result whether or not to spend money, because parents that practiced sports during youth are supposed to transfer their (positive) experiences to their children. Therefore we expect these families to participate in sports, and to spend money on sports participation. Moreover, we believe that once these parents and children decided to spend money on sports, they do not spend higher amounts of money. This is because we are convinced that other factors have more influence on the amount of money that is spent. Second, we carried out a logistic regression followed by OLS to test this hypothesis. The analysis gives significant results for the logistic regression (p<0.001), but not for the OLS.

5. Results

Table 4.2 presents the results of the two-step Heckman approach with regard to the determining factors of household expenditure on sports participation. First, the likelihood ratio test clearly indicates (p<0.001) that the Double Hurdle approach (LL=-2970.64) should be preferred over the Tobit Model (LL=-4121.6327), so the Tobit model is not suited for the data. Second, the Vuong-test (Vuong, 1989) is applied to test the suitability of non-nested models, like two-step Heckman and Double Hurdle (e.g. Aristei & Pieroni, 2008; Wodajo, 2007). The Vuong-test does not provide significant differences between the two-step Heckman and the Double Hurdle model. Moreover, we also carried out the Craggit Double Hurdle approach, and the results turned out to be only slightly different compared to the results of the two-step Heckman approach. Third, the significance of the Inverse Mill's Ratio (p<0.001) makes clear that the two-step Heckman approach is suited for the analysis of this specific data.

We first test the three hypotheses that focus on the factors of the household production theory, namely income level, education and intensity of sports participation (see Table 4.2). Households that have a higher income, spend more money on sports participation, and do this more often (H1). This is especially

the case for the highest income level, compared to the lowest income level. The second factor is represented by two variables, namely education (socioeconomic capital) and whether the parents of the households practiced sports during their youth (sports-specific capital). While previous research states that education has an influence on the amount of money that is spent, our two-step approach shows that the relation is a bit ambiguous (H2a). Education influences only the first step of the equation, and not the second one. In other words, families with a low educated head of household have a lower chance to spend money on sports participation. However, once they decide to spend money on sports participation, these households spend the same amount of money, compared to higher educated households.

The second part of the second hypothesis (sports-specific capital) also seems to positively influence the household consumption pattern. Households with parents that practiced sports during their youth have a higher chance to spend money on sports participation. They also spend larger amounts of money on sports participation (H2b).

Households that participate more frequently in sports are more likely to spend money on sports participation, but surprisingly only households that have a high frequency (and not families with moderate frequency) of sports participation spend higher amounts of money compared to households with a low frequency (H3a). A possible explanation is that households that participate in sports on an irregular basis (low frequency) need to pay the same membership fees, sports apparel, etc. compared to households with a moderate frequency. Also, households with a large proportion of sports club members have a higher chance to spend money on sports participation, and they also spend larger amounts of money (H3b).

As expected, households with a young child spend lower amounts of money on sports participation, but there is no difference in the participation decision between both categories (H4c). The control variable household size indeed has a negative influence on the amount of money spent (but not on the participation decision), as well as the instrumental variable sports participation of the parents (H4a). The number of parents (H4d), the residence of the household (H4e) and the age of the head of household (H4b) have no significant influence on the family spending behavior.

TABLE 4.2
Determinants of household expenditures on sports participation for the participation decision (yes-no) and the consumption decision (amount of money that is spent)

	Participation decision		**Consumption decision**	
Variable	Estimate	z-value	Estimate	z-value
Sports participation parent(s)				
No (ref.)				
Yes	0.33***	3.62	/	/
Family income				
Low (ref.)				
Moderate	0.23*	2.49	0.18*	2.31
High	0.32**	2.88	0.39***	4.67
Education head of household				
Primary (ref.)				
Secondary	0.30**	3.06	-0.11	-1.29
Higher	0.38***	3.64	-0.06	-0.60
Sports participation parent(s) during their youth				
No (ref.)				
Yes	0.31***	3.49	0.27**	3.06
Proportion of households that is sports club member				
Low (ref.)				
Moderate	0.61***	5.66	0.25**	2.85
High	0.55***	4.16	0.52***	5.69
Sports participation frequency of household				
Low (ref.)				
Moderate	0.64***	6.68	0.12	1.09
High	0.50***	4.41	0.27*	2.55
Household size				
≤ 3 members (ref.)				
4 members	-0.13	-1.22	-0.30***	-3.66
5 members	-0.24	-1.88	-0.50***	-5.06
≥ 6 members	-0.22	-1.47	-0.45***	-3.89
Age head of household				
≤40 yrs (ref.)				
41-50 yrs	0.12	0.24	0.09	1.16
>50 yrs	0.15	0.24	0.05	0.54
Age youngest child				
>6 yrs (ref.)				
≤6 yrs	0.08	0.76	-0.28	-3.60
Number of parents				
1 (ref.)				
2	0.02	0.14	-0.02	-0.26
Socioeconomic type of residence				
Urbanized (ref.)				
Central municipality	0.12	0.55	-0.16	-0.99
Concentric economic activity	0.36	1.49	-0.36	-2.02
Rural	0.37	1.54	-0.15	-0.87
Semi-urbanized	0.32	1.32	-0.20	-1.15
Touristic	0.33	1.09	-0.02	-0.08
Municipality	0.38	1.59	-0.23	-1.30

Note. *p<.05. **p<.01. ***p<.001.

6. Discussion

With regard to sports participation and his specific data, Downward (2007) states that more support is found for the predictions based upon heterodox theories compared to neoclassical theories (such as the household production theory). The results of this present study show that in general, the household production theory of Becker (1965) performs rather well in explaining household spending on sports participation. As suggested by the theory of Becker (1965), family income proved to be an influencing factor (which is in accordance with Bloom et al., 2005; Dardis et al., 1994; Jones, 1989; Lamb et al., 1992; Lera-López & Rapún-Gárate, 2007; Taks et al., 1995; 1999; Weagley & Huh, 2004), as well as sports participation during youth (sports specific capital). Two proxies of the intensity of sports participation also positively influence household spending, namely sports participation frequency and sports club membership. This is in line with previous research for both frequency (Lera-López & Rapún-Gárate, 2007, Scheerder et al., 2011, Wicker et al, 2010) and sports club membership (Taks et al., 1999). Another reason why the variables suggested by the theory of Becker are more relevant to answer our research questions, is these variables being more practical in segmenting the target population, compared to the variables suggested by heterodox approaches. Also other demographic variables were analyzed.

The amount of money spent on sports participation is determined by the household size, but the decision to spend money (or not) is not. As expected, the larger the family, the lower the amount of money that is spent per family member (see also Scheerder et al., 2011). Households with at least one child younger than six years, spend less money on sports participation. This conclusion was also expected (e.g. Pawlowski & Breuer, 2011), and can be attributed to the fact that the care for young children is time-invasive such that their parents have less time left to participate in sports.

Opposed to previous research (e.g. Dardis et al., 1994), no significant relationship was found between the age of the head of household and the sports spending behavior of families. Probably the latter is due to the rather specific age range of the head of household. In most cases, parents are middle-aged people, such that young and old people are underrepresented in the research sample. Thus, although a real age-effect possibly does not exist, we still should look for a generation-effect. Also, contrary to previous research (among them Pawlowski & Breuer, 2011; Weagley & Huh, 2004) no significant influence of the residence was found. Probably this is caused by the specific urbanization of Flanders, which is a highly crowded region with no big difference between cities and rural municipalities.

With regard to our data, theoretical arguments (Garcia & Labeaga, 1996; Humphreys et al., 2010; Pawlowski & Breuer 2011) plead for the use of the two-step Heckman approach over the Double Hurdle model, while the statistical Likelihood Ratio Test rules out the Tobit model, and the Vuong-test shows no difference between the two-step Heckman and the Double Hurdle approach. The results of the present study demonstrate that a two-step approach is needed to deal properly with spending data. Indeed, for some variables the determinants differ for the participation decision on the one hand, and the consumption decision on the other hand. In this respect, the influence of the educational level of the head of household (socioeconomic capital) clearly demonstrates the importance of a two-tier approach. The household education positively influences the decision whether or not to spend money on sports, but does not influence the amount of money spent. Also, surprising is the negative effect – though not significant – of education on the consumption. A possible explanation for this is that higher educated households are more aware of the benefits of sports participation. Therefore they are expected to more

often take part in sport. The household production theory also suggests that higher educated people are more efficient in satisfying their needs, like for example sports participation. The latter can possibly explain the negative sign, although this sign is not significant.

The use of a two-step approach has also practical consequences. Based-upon a one-step approach sports managers and marketers of the commercial sector could conclude that high educated people are bigger spenders, and that they should focus on this group in order to rise their profits. Instead, the results of our study show that companies should make efforts to convince lower educated families to participate in sports, and to spend money on sports participation. This is because these consumers spend the same amount of money on sports participation, compared to their counterparts. Marketers and managers from the public and civic sector can also draw conclusions on these findings. If they want to convince lower-educated people to participate in sports, they have to convince them to overcome the first hurdle. Indeed, once households participate in sports, they spend the same amount of money on sports as their higher educated counterparts.

Given the relatively large amounts of money that households spend on sports participation, sport providers in the civic, commercial and public sector need to be conscious of the variables which affect the decision whether or not to spend money on sports participation. Moreover, they have to be aware of the determinants of the amount of money that sport participants spend. On the one hand, the public sector needs to understand the consumption pattern of their customers in order to intervene properly in the market, for example to remove barriers that retain people who live in poverty from sports participation. On the other hand, sports managers and sports marketers in the commercial sector need to satisfy their customers. By altering customer satisfaction, profits can be altered. Based upon the results of this study, the public, civic and commercial sector can implement segmentation and differentiation strategies in order to augment customer satisfaction and thereby altering their social or economic profit. Although classic mass media not always allow for specific targeting based upon the variables that have been used in this study, it is possible to use a medium (newspaper, channel, etc.) for which the composition of the audience (readers, watchers, etc.) matches the target population best. Moreover, the popularity of social media such as Facebook offers opportunities in applying the results of this study. For example, the technological bases and the databases of social media such as Facebook allow for specific segmentation (Miller & Lamas, 2010). More particularly, social media make it possible to select individuals based upon their sex, age, profession, et cetera. In summary, sports managers and marketers can use the results of this study in both classic and 'new' social media, and thereby alter the satisfaction of the customers, and the (economic) profit of their institution.

7. Conclusion

In the present study, the influencing factors of household expenditure were analyzed. The household production theory of Becker was suited to analyze the sports expenses that households make. Family income, education of the head of the household, sports participation of the parents during their youth, sports club membership and the frequency of sports participation have a positive influence on the household spending behavior.

A limitation of this research is that it only accounts for families with school-aged children. So, childless families, families with (only) little children, and retired and old people are underrepresented in this

study. Another limitation is the fact that we focus on variables that are suggested by the theory of Becker (1965). Future research should also focus on variables of the heterodox approaches.

This research is also limited in that it handles a very broad category of expenses. Therefore we suggest to analyze the dependent variable 'sports expenditure' in more detail. First, it could be interesting to analyze expenditure on specific sports, like for example cycling, running or team sports. Second, the broad category of expenses could be narrowed down to some specific cost categories, for example membership costs, or expenditure on sports apparel. In both cases, this would imply a (even) larger proportion of zero-expenditure, which in their turn could imply that the Double Hurdle model is more suited for this particular dataset.

Methodologically, a two-step approach was needed to deal with zero-expenditure. Particularly, a two-step Heckman approach fits the data best. In future research we suggest to analyze (household) sports expenditure data by means of two-stage approaches. The choice between the Double Hurdle approach and the two-step Heckman approach depends on the specific data. Because of the lack of expenditure studies on sports participation, a lot of research still needs to be done. Moreover, future research needs to apply this model to different populations, to different sports and to different expenditure categories, such that we better understand how these methods apply to specific sports (expenditure) data. A last suggestion concerns the kind of research that is conducted here. Our research noticed that households with low education spend the same amounts of money on sports participation, once they decided to spend money. Therefore, market research should focus on the reasons why lower-educated people abstain from consuming, and which strategy could convince them to spend money on sports participation. A limitation of this research is possibly the generalizability of the research. This research has been conducted in Western-Europe, more particularly in Flanders. Each country (region) has its own characteristics with regards to sports on the one hand, and economics on the other hand. More research needs to be done on whether (a part of) the conclusions of the present study are also applicable to other regions in and beyond Europe.

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CHAPTER 5
Financial Barriers to Practice Sports: The Dynamics of the Income-Expenditure Relation (Paper 2)

This chapter is submitted as a paper to an international peer-reviewed journal

Thibaut, E., Eakins, J., Willem, A., & Scheerder, J. (under review). Financial barriers to practice sports: The dynamics of the income-expenditure relation.

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1. Abstract

Given the economic crisis, the rising poverty rates and the public savings, it is essential to get insight in the effect of income on sports expenditure. The current study uses a Tobit model to calculate income elasticities for different levels of household income on the one hand, and personal income on the other. For both personal and household income, similar trends in the elasticities were found, although values of the latter tend to be little higher. For lower income individuals, a rise in income has a relatively bigger influence on the probability to spend money on sports participation, than is the case for higher income individuals. On the contrary, once people took the decision to spend money on sports participation, higher income individuals have higher income elasticity values. As income is not the only potential barrier in consuming sports, the study also includes sociodemographic, socioeconomic, sports-specific and non-sports leisure variables. A positive relationship is found with sex (male), education, number of minutes and disciplines of sports and membership of a socio-cultural organisation, while age, watching TV and attending cultural events have a negative effect. Because the latter can be perceived as an indication that substitution between different kinds of leisure is apparent, it is remarkable that no significant effects on expenditure were found for measures of overall time restrictions (i.e. the subjective perception of available free time, the amount of household tasks that one performs).

2. Introduction

Sports participation is regarded as one of the many citizen rights of the social welfare state. Although the general belief is that everyone should have the opportunity to practice sports, the financial crisis, the economic crisis and the rising poverty rates have increased the chance that families and individuals with low income are excluded from sports participation (Bittman, 2002). This has implications for Western governments in reaching the Sport-for-all objective. Research indicates that people who are already on the lowest incomes are affected most by economic savings (Quarmby & Dagkas, 2013), which is not surprisingly as leisure ranks high on expenses that are cut in households that face financial difficulties (Deutsch, Guio, Pomati & Silber, 2015). The risen income inequality in almost every Western country (Pickett & Wilkinson, 2015) has resulted in lower participation rates, as demonstrated by Veal (2016).

Previous empirical studies found that sports participation is socially stratified (Scheerder & Vos, 2011), and underlined the positive relationship between income and sport consumption (e.g. Hoekman, Breedveld & Kraaykamp, 2016; Thibaut, Vos & Scheerder, 2014; Wicker, Breuer & Pawlowski, 2010). Nevertheless, these studies focus solely on the influence of *average* income on sports expenditure. Because this results in a rather static picture, the aim of the current paper is to gain insight in the dynamics of the income-sports expenditure relationship by focussing on different income-levels. This paper will calculate the magnitude of the effect of income on sports expenditure for different levels of income, with a focus on people with lower levels of income.

More particularly, the current study (1) focusses on two measures of income which are individual labour income versus household labour and non-labour income, and (2) investigates two outcomes of an increase in income, namely the effect of a rise in income on the decision to spend money or not, and on the amount of money that is spent. The former point is relevant, because in previous research both forms of income have been used. To know whether the results of these studies are comparable, it should be investigated whether the effects of both income variables on expenditure are identical or not. With respect to the second point, research has demonstrated that expenditure on sports participation should be considered as a two-stage decision process, as differences are found in the significance and direction of the effect of the independent variables on sports participation and sports expenses (e.g. Pawlowski & Breuer, 2011; Thibaut et al., 2014). It is expected that these differences will certainly apply to the magnitude (i.e. elasticities) of the income-expenditure effect.

Although income is an essential barrier in spending money on sports, it is not the only determinant, and according to some studies it is not the most influencing factor of sports expenditure (e.g. Scheerder, Vos & Taks, 2011; Spinney & Millward, 2010). The second aim of the current study is therefore to investigate to what extent other sociodemographic, socioeconomic, sports-specific and non-sports leisure variables influence the sports expenditure decisions. The inclusion of the non-sports leisure variables is interesting, as it allows for an examination of whether they interfere positively (complements), negatively (substitutes) or not at all with spending money on sports.

3. Literature review

Although sports consumption has historically been underexposed in academic research (Downward, Dawson & Dejonghe, 2009, p. xvi), in recent years a rising number of studies aim to close this gap (for an overview, see Thibaut, Vos, Lagae, Van Puyenbroeck & Scheerder, 2016; Table 5.1 in Wicker et al., 2010, p. 216). Downward et al. (2009, p. 66) define two essential components of sports consumption, specifically sports participation (time spent on sports) and sports expenditure (expenses to practice sports). Although the focus of the current study is on sports expenses, both concepts are closely related to each other, as taking part in sports on a regular and qualitative basis is impossible without spending money expenditure such as the acquisition of certain sports apparel (Downward et al., 2009, p. 66; Humphreys & Ruseski, 2015).

3.1. Income effects

The relationship between sports consumption and income has been investigated in numerous socioeconomic studies. With respect to sports participation, it is found that income positively influences the probability of taking part in sports (Garcia, Lera-López & Suárez, 2011; Humphreys & Ruseski,

2015), and that living in poverty reduces participation in organised sports participation (Vandermeerschen, Vos & Scheerder, 2015).

The above information is also relevant for the income-expenditure-relation, as it can be assumed that to take part in sports, people have to spend money on certain sports goods and services. Empirical results of Thibaut et al. (2014) and Pawlowski and Breuer (2011) confirm the positive effect of income on the probability of spending money on sports. Income also has a positive influence on the amount of money that is spent (Bloom, Grant & Watt, 2005; Hallmann & Wicker, 2015; Eakins, 2016; Lera-López & Rapún-Gárate, 2005; 2007; Løyland & Ringstad, 2009; Thibaut et al., 2016; Wicker et al., 2010; Wicker, Prinz & Weimar, 2013). The latter contrasts with the negative relationship between income and the number of sports participation minutes, as found by Garcia et al. (2011) and Humphreys and Ruseski (2015). Stated differently, income positively determines both the decision to spend money on sports and the amount of money that is spent, while only the former holds for sports participation.

While the above results refer to the significance and sign of the income-expenditure effect, the magnitude can be calculated through income and expenditure elasticities. Elasticities represent the percentage change in expenditure in response to a percentage rise in income. For Germany elasticities were found of +1.20 based on the classic Tobit model and +0.78 based on the two-step Heckman approach (Pawlowski & Breuer, 2012), while for Norway an estimate of +1.25 was found (Løyland & Ringstad, 2009) and +1.139 for Ireland (Eakins, 2016). Nevertheless, because these studies focus on the average effect of average income on sports expenditure, little is known about the dynamics of this relationship. The consequence is that this elasticity value not necessarily indicates the extent to which people on low incomes are held back from spending money on sports. Therefore, the first research goal of the current study is to calculate the income elasticities for different levels of income, for both the decision to spend money on sports and the amount of money that is spent.

Moreover, two measures of income will be compared, as it is interesting to notice that different operationalisations of income have been used in previous sports consumption literature. A first distinction in operationalisation is that some research uses labour income (e.g. Downward & Rasciute, 2010; Hallmann & Wicker, 2015), while in other studies non-labour income (e.g. rent, capital income, pensionable salary) is included (e.g. Humphreys & Ruseski, 2015; Thibaut et al., 2014). From a theoretical point of view, this could possibly result in differing income-expenditure-relationships as input of time is needed for the former compared to the latter. Therefore, for both labour and non-labour income, the positive relationship with sports expenditure is considered to stem from an income effect, meaning that the more income that someone has, the more he or she will consume. But according to the time allocation theory of Becker (1965) an opposite effect is also possible. A higher income/wage rate not only means that more money can be spent, but also results in a higher opportunity cost of time, such that it can also be expected that leisure time is substituted for work. Becker (1965) argues that a higher wage rate induces a shift away from time-intensive commodities (such as sports participation) as the price/opportunity cost of 'free time' becomes higher. Humphreys and Ruseski (2015) indeed find empirical evidence to suggest that, although the income effect is dominant, a substitution effect regarding sports participation also exists. Furthermore, Késenne (1983) finds evidence that, with rising wage rate, time-intensive activities (e.g. sports participation) are often substituted for other less time-consuming activities. To summarise, it can be expected that the effect of non-labour income on sports expenditure is more prominent than is the case for labour income.

A second income-operationalisation difference is that certain studies opted for personal income (e.g. Hallmann & Wicker, 2015; Wicker et al., 2010; Wicker et al., 2013) as opposed to household income (Lera-López & Rapún-Gárate, 2005; 2007; Løyland & Ringstad, 2009; Thibaut et al., 2011) to investigate income-expenditure relationship. Although both measures have certain advantages, Spinney and Millward (2010), favour the use of household income instead of personal income, because he assumes that the benefits of income are well-distributed among family members. As information about the wage rate is often not included, studies instead use income (e.g. Downward & Rasciute, 2010; Hallmann & Breuer, 2014; Wicker, Breuer & Pawlowski, 2010), thereby assuming that – on average – the wage rate varies proportionally across different income levels. With regard to the latter, when Becker's (1965) allocation theory of time is applied, household income also includes income from other family members and can therefore be expected to be less subject to 'foregone earnings' (and thus substitution effects) as is the case for personal income. Put differently, if a substantial substitution effect exists it can be expected that the effect of household income on sports expenditure would be larger than is the case for personal income.

3.2. Other sociodemographic and socioeconomic determinants

In addition to income, other sociodemographic and socioeconomic determinants have been investigated in sports expenditure research. Previous research demonstrated that classic sociodemographic and socioeconomic variables are relevant factors for segmentation purposes. Male individuals with a job, a life-partner and a higher education are found to be bigger spenders on sports participation (for a detailed overview of these results, see Thibaut et al., 2016; Wicker et al., 2010).

The relationship between age and expenditure is less straightforward. Some researchers find that younger adults spend more money (Lera-López & Rapún-Gárate, 2007), while other studies find no significant relationship (Lera-López & Rapún-Gárate, 2005; Scheerder et al., 2011), a positive relationship (Hallmann & Wicker, 2015; Wicker et al., 2013) or a curvilinear relationship (Eakins, 2016; Lamb, Asturias, Roberts & Brodie, 1992). Household size is positively related to overall household expenditure (Bloom et al., 2010), although expenditure per family member turns out to be lower (Scheerder et al., 2011; Thibaut et al., 2014).

Disposable time is believed to be a key factor in sports participation, as both Spinney and Millward (2010) and Crompton (2015) find that time poverty is a more profound barrier than income in the discrete choice between consuming sports or not. In contrast, Hallmann and Wicker (2015) found that time availability is not a constraint in spending money on the specific sports activity golf.

3.3. Sports and leisure variables

Research demonstrates that dedicated sports participants spend more money, as taking part in sports on a higher level and on a more frequent and time-intensive basis is positively related to sports expenses (Lera-López and Rapún-Gárate, 2005; 2007; Scheerder et al., 2011; Thibaut et al., 2016; Wicker et al., 2010, 2013).

In contrast to the sports-specific variables, little research is available regarding the interdependency between consuming sports participation and other leisure activities (Pawlowski & Breuer, 2011). The studies of Pawlowski and Breuer (2011; 2012) demonstrate that, despite certain differences, a lot of similarities are found between the consumer profiles of distinct leisure activities.

On the one hand one could expect that all providers of leisure activities aim to increase their market share and thus compete for the 'free time' of citizens. According to this theory, sports and other leisure activities thereby function as possible substitutes for each other (Crompton, 2015; Roberts, 2015). The negative correlation between watching television and active engagement in sports is an example of this negative relationship between different leisure activities, both of which should therefore be seen as substitutes (Dawson & Downward, 2013; Scheerder et al., 2011).

On the other hand, it is also possible that practising sports goes hand in hand with more consumption of other leisure activities. Spillover effects suggest that complex skills like sports participation and cultural activities need to be learned. The use of identical goods generates accumulating consumption capital (Wicker et al., 2010), meaning that the consumption of one activity results in higher consumption of other related activities (Burgham & Downward, 2005). Empirical evidence indeed demonstrates that sports consumption is positively influenced by certain other leisure activities such as reading, listening to the radio, painting, dancing and arts (Downward, 2007). The second research goal of this study is to provide in further evidence to map the interdependency between sports consumption and other leisure activities, and this for leisure activities for which no previous research was found.

4. Methodology

4.1. Data

The study is conducted based on data collected within the 2014 Flemish Participation Survey (Scheerder, Thibaut & Willem, 2015). The 2014 version is part of a cross-sectional survey that is requested by the Flemish government every five years, with questions regarding the socio-cultural participation habits of its citizens. Oral interviews were taken from a representative sample of 3,965 Flemish inhabitants aged between 14 and 85 years. Because the focus is on adults, only the respondents above 18 years old are included in this study (N=3,775 adults).

Seven categories of sports expenditure were measured in the questionnaire (membership fees, use of sports infrastructure and participation in events, sports lessons/camps/holidays, sports clothing and shoes, sports equipment, transport by car, other costs such as sports drinks/food and medical care), and together these comprise total expenditure on sports participation, the dependent variable in this research (EXP, see Table 5.1). The independent variable of interest in the current study is income. The variable income is operationalised through taking the logarithm of both household income (LOG_INC_HH) and personal income (LOG_INC_PERS). The former consists of income earned through labour and non-labour (e.g. capital, rent) by all family members, and is available for all categories of citizens. The latter excludes non-labour earnings, and is asked to the respondents with a paid job, and thus not retirees, houseman/women, students, etc. The analyses based on LOG_INC_PERS are only performed on individuals with a job, thus resulting in a much lower N of 1,901 than is the case for LOG_INC_HH (N=3,177). Apart from the income variables, the other socioeconomic variables are the percentage of a fulltime job (PERC_FT), the level of education (EDUC) and the amount of free time each individual has (LEIS_SUBJ).

The sociodemographic variables are gender (SEX), age (AGE), having a life partner or not (PARTN) and the number of family members (FAM_MEM). The variables duration (SP_MIN) and diversity (SP_DIV) form the sports-specific variables, while the other leisure variables indicate whether the

TABLE 5.1
Descriptive statistics of the dependent and the independent variables

Variable	Definition	Mean (SD) or Frequency	
		Household income (N=3177)	*Personal income (N=1901)*
EXP	Total annual expenditure on sports participation	€378.38 (17.06)	€443.71 (21.49)
LOG_INCOME_HH	Logarithm of the labour and non-labour household income	7.89 (0.01)	/
LOG_INCOME_PERS	Logarithm of the labour personal income	/	7.50 (0.01)
SEX	Gender	*Man* (50.27%) – *Women* (49.73%; REF)	*Man* (51.92%) – *Women* (48.08%; REF)
AGE	Age	*18-34* (21.53%; REF) – *35-54* (36.36) – *54-65* (18.38) – *65+* (23.73)	*18-34* (29.51%; REF) – *35-54* (54.34) – *54-65* (15.41) – *65+* (0.74)
PARTN	Respondent has a life partner	*Yes* (78.00%) – *No* (22.00%; REF)	*Yes* (81.96%) – *No* (18.04%; REF)
FAM_MEM	Number of family members	2.67 (0.02)	3.02 (0.03)
EDUC	Level of education	*Still a student* (5.00%) – *Primary School* (9.38%; REF) – *Secondary* (49.51%) – *Higher* (36.10%)	*Still a student* (0%) – *Primary School* (2.79%; REF) – *Secondary* (48.40%) – *Higher* (48.82%)
JOB	Job status	*Job* (55.87%; REF) – *Retired* (28.20%) – *No paid job* (15.93%)	*Job* (100%)
PERC_FT	Percentage of a fulltime job	50.70 (0.84)	90.53 (0.84)
HH_WORK	Household tasks ranging from very little (1) till very much (8)	5.28 (0.03)	5.31 (0.03)
LEIS_SUBJ	Subjective perception of the amount of available leisure time ranging from very little (1) to very much (7)	3.57 (0.03)	3.05 (0.03)
SP_MIN	Number of minutes a year that someone participates in sports	7703.43 (225.94)	6994.62 (245.72)
SP_DIV	Number of sports activities that someone took part in during the past year	1.01 (0.02)	1.14 (0.02)
TV	Frequency of TV-watching	*Low* (29.15%; REF) – *Middle* (42.71%) – *High* (28.14%)	*Low* (35.14%; REF) – *Middle* (41.19%) – *High* (23.67%)
CULT	Respondent took part in a cultural activity (cultural heritage, art, museum) during the last 6 months	*Yes* (54.74%) – *No* (45.26%; REF)	*Yes* (58.76%) – *No* (41.24%; REF)
SC_ORG	Respondent is a member of a socio-cultural organisation (culture, charity, etc.)	*No* (44.57%; REF) – *Active Member* (37.83%) – *Organising member* (17.60%)	*No* (43.14%; REF) – *Active Member* (38.03%) – *Organising member* (18.83%)
BOOKS	Respondent read books and/or strips during the past 6 months	*Yes* (56.85%) – No (43.15%; REF)	*Yes* (62.34%) – *No* (37.66%; REF)

respondent watched television (TV), took part in cultural activities (CULT), was an active member of a socio-cultural organisation (SC_ORG) or read books or comic strips (BOOKS) during the past six months.

4.2. Regression methodology

The normality assumption of linear regression is violated because of excess zeros, suggesting that a methodology that accounts for the presence of excess zeros should be preferred. Three groups of these methods are used in sports consumption literature, namely the Tobit model (e.g. Eakins, 2016), two-step Heckman (e.g. Thibaut et al., 2014) and hurdle approaches (e.g. Humphreys & Ruseski, 2015). These methods differ in the way they attribute the zeros to underlying censoring mechanisms (Jones, 2000).

First, a distinction should be made between real zeros and non-genuine zeros. The Heckman approach is designed to deal with the latter. Non-genuine zeros occur because of sample selection, for example when the reference period for certain respondents to consume expenditure is too short (Jones, 2000). Because of the wide range of possible activities, the fact that almost every sports participant spends money during a reference period of one year, this option can be excluded.

Both the Tobit (Tobin, 1958) and the hurdle models assume that the zeros stem from actual non-consumption, and are thus 'real' zeros. The Tobit model assumes that zero consumption is due to a constrained budget, or put differently, that the zeros are corner solutions (Aristei & Peironi, 2008). On the other hand, hurdle models not only account for corner solutions, but also for abstention. Another aspect of the hurdle model is that its design is less restricted, as the coefficients of the participation (spending money or not) and intensity (amount that is spent) decision are not necessarily the same. One of the reasons why the current study opts for the Tobit model, is because of the focus is on the continuous variable income, and the potential burden of a constrained budget. From a practical and methodological point of view, the estimated hurdle models gave no fit and/or underperformed when compared with the Tobit model through a Vuong-test (Vuong, 1989).

In order to assess the impact of the two measures of income on the dependent variable, it is necessary to calculate elasticities. In the Tobit model three different elasticities can be calculated based on three different definitions of the expected value of the dependent variable. Of most interest is the overall effect on the dependent variable. In the Tobit model, this is more commonly known as the unconditional expectation (or unconditional mean) because it is based on all values of the dependent variable rather than a subset of positive values for example. The unconditional expectation can be decomposed into two parts, the conditional expectation, which is the expected value of the dependent variable for values of the explanatory variables, x, conditional of dependent variable being positive and the probability of a positive value of the dependent variable for values of the explanatory variables, x.

For each definition of the expected value of the dependent variable elasticities can be calculated using the following formula:

$$e_{Prob} = \frac{\partial P[y_{exp}>0|\mathrm{x}]}{\partial Income} * \frac{Income}{P[y_{exp}>0|\mathrm{x}]} \quad (1a)$$

$$e_{Cond} = \frac{\partial E[y_{exp}|y_{exp}>0,\mathrm{x}]}{\partial Income} * \frac{Income}{E[y_{exp}|y_{exp}>0,\mathrm{x}]} \quad (1b)$$

$$e_{Uncond} = \frac{\partial E[y_{exp}|\ \mathrm{x}]}{\partial Income} * \frac{Income}{E[y_{exp}|\ \mathrm{x}]} \quad (1c)$$

These elasticities were calculated using the margins command in Stata. An interesting feature of the above Tobit elasticities is that the elasticity for the probability of a positive expenditure (e_{Prob}) and the elasticity for conditional expenditure (e_{Cond}) sum to the overall unconditional elasticity (e_{Uncond}), that is $e_{Uncond} = e_{Prob} + e_{Cond}$. This will allow for an investigation into the contribution that changes in the probability of participation for a change in income and changes in conditional expenditures for a change in income have on the overall effect i.e. unconditional expenditure.

5. Results and discussion

Two sets of Tobit regression results are presented, one with the logarithm of household income (LOG_INCOME_HH) and the other with the logarithm of the personal income (LOG_INCOME_PERS) (Table 5.2, respectively the left and right columns). Overall, the regression results of both groups resemble each other even when taking into account the fact that the latter group is based on a smaller sample. People with higher income spend more money on sports participation, which is consistent with previous research (Eakins, 2016; Hallmann & Wicker, 2015; Lera-López & Rapún-Gárate, 2005; 2007; Løyland & Ringstad, 2009; Thibaut et al., 2014; Wicker et al., 2010, 2013). The results indicate that income positively influences sports consumption, and thus lower income individuals face a bigger barrier when spending money on sports participation. A consequence is that lower-income households are potentially excluded from (expensive) sports activities.

Given that income is an important factor in the decision to spend money on sports participation, it is essential for sports managers and policy makers to gain insight into the magnitude and the dynamics of the income-expenditure effect. The graphs in Figure 5.1 present a schematic overview of the effect of a relative change in income on the relative change in expenditure, and this for different levels of household income (LOG_INCOME_HH, graphs 1-3) and personal income (LOG_INCOME_PERS, graphs 4-6). Graphs 3 and 6 show the effect of income on overall sports expenditures (zero and non-zero values). While the Tobit regression results of Table 5.2 show that income positively influences sports expenses, graphs 3 and 6 show that the relative effect an income rise is higher for lower income-levels. A 1.0% rise in income results in a 0.6% rise in expenditure for the lowest incomes, while it is only 0.4% for the highest income levels. Nevertheless, this effect needs to be split in two, as the expenditure question consists of two related decisions, i.e. (i) spending money on sports participation or not, and if so, (ii) the amount of money that is spent on sports participation.

TABLE 5.2
Tobit regression results for the determinants of expenditure on sports participation, with household (left, N=3,177) and personal (right, N=1901) income as the dependent variable

EXP	Coef.	EXP	Coef.
LOG_INCOME_HH	372.0***	LOG_INCOME_PERS	331.6***
SEX	195.9***	SEX	94.5
AGE_2	-69.7	AGE_2	-100.2
AGE_3	-326.5***	AGE_3	-336.0***
AGE_4	-486.3***	AGE_4	121.1
PARTN	36.8	PARTN	113.9
FAM_MEM	-39.6	FAM_MEM	-11.0
EDUC_1	422.5*	EDUC_1	Omitted
EDUC_3	321.6**	EDUC_3	348.3
EDUC_4	344.5**	EDUC_4	325.2
JOB_2	-57.2	JOB_2	Omitted
JOB_3	79.4	JOB_3	Omitted
PERC_FT	0.1	PERC_FT	-0.8
HH_WORK	2.2	HH_WORK	5.6
LEIS_SUBJ	3.7	LEIS_SUBJ	2.1
SP_MIN	0.03***	SP_MIN	0.03***
SP_DIV	667.0***	SP_DIV	608.7***
TV_2	21.5	TV_2	-128.2*
TV_3	16.2	TV_3	-32.7
CULT	-82.4	CULT	-162.3**
SC_ORG_2	317.9***	SC_ORG	330.2***
SC_ORG_3	227.3***	SC_ORG	332.8***
BOOKS	44.7	BOOKS	45.2
_cons	-4452.2***	_cons	-3729.9***
Sigma	1165.5	Sigma	1035.5

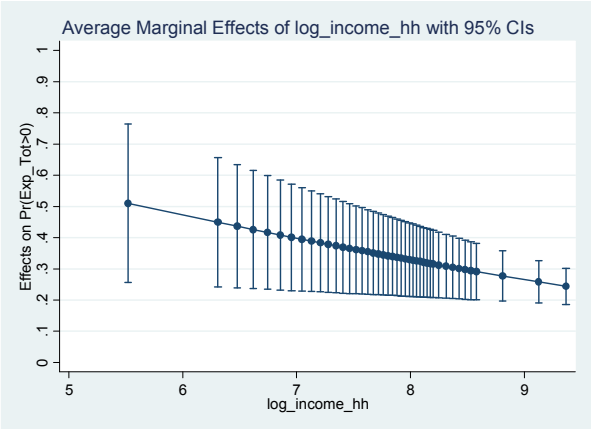
Note. *p<.05. **p<.01. ***p<.001.

In graph 1 and graph 4 the effect of a relative change in income on the probability of spending money is given. When income rises by one percent, the probability of spending money rises by a factor of between 0.5 percent and 0.2 percent, depending on the income level. This positive effect is stronger for individuals with a lower personal and household income, suggesting that monetary scarcity is a significant and relative important barrier in consuming sports. Graph 2 and 5 are based on the sports participants that already have chosen to spend money, and they represent the effect of income on the amount of money that is spent. Sports participants that face an increase of 1% in income spend 0.1% extra on sports participation. The flat curve demonstrates that this change is relatively equal for all income levels.

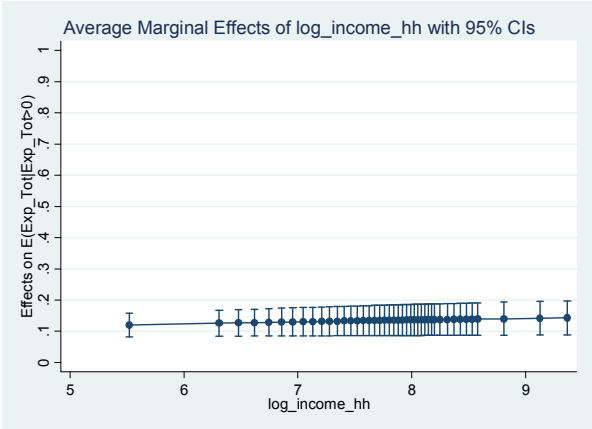
Next, we turn to the differences between the graphs based on household income (graphs 1-2-3) on the one hand, and the graphs based on personal income (graphs 4-5-6) on the other hand. Overall, the trends in both groups are more or less the same, such that we could say that personal income and household income are good proxy variables for each other. A small difference that can be noticed is that changes in LOG_INCOME_HH influence the probability of spending money on sports to a slightly bigger extent than is the case for changes in LOG_INCOME_PERS. A possible explanation can be found in Becker's time allocation theory (1965) that assumes that higher income levels imply a higher opportunity cost of

FIGURE 5.1
Graphical overview of the effect of income on sports expenditure with rising income levels (graphs 1-6).

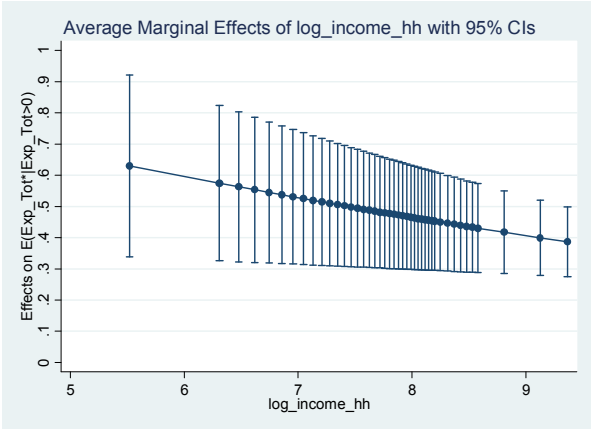
Effect of household LOG_INCOME_HH (1)
on the probability of spending money

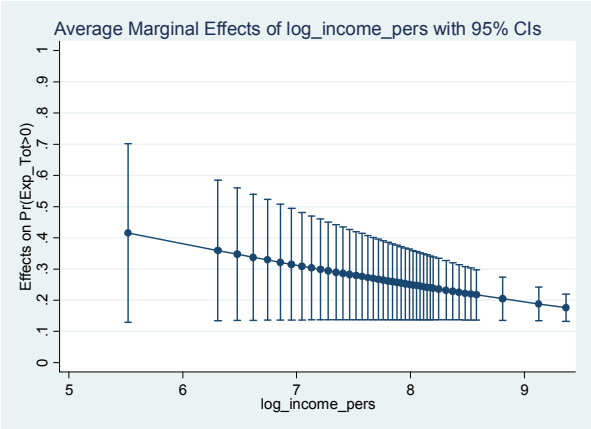


Effect of LOG_INCOME_HH (2)
on the amount of money that is spent
only for people who decided to spend money

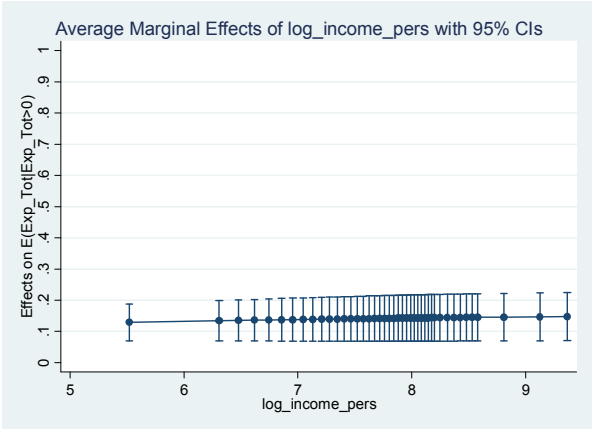


Effect of LOG_INCOME_HH (3)
on the amount of money that is spent
(unconditional)

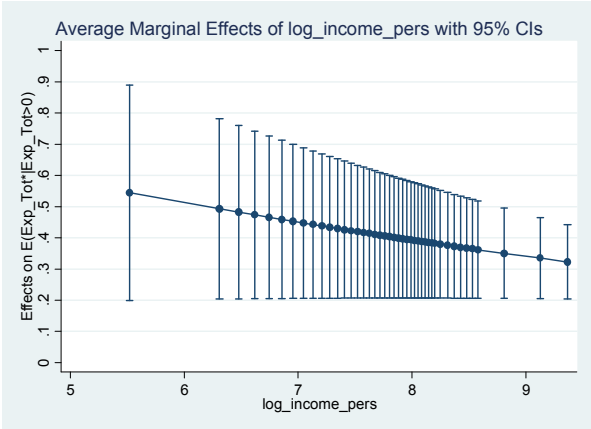




Effect of LOG_PERSONAL_INCOME (4)
on the probability of spending money



Effect of LOG_PERSONAL_INCOME (5)
on the amount of money that is spent,
only for people who decided to spend money



Effect of LOG_PERSONAL_INCOME (6)
on the amount of money that is spent
(unconditional)

time. Therefore, a wage rise not only increases the chance of spending money on sports through a direct income effect, but at the same time it also has a small but negative substitution effect on the decision to spend money on sport because of a risen opportunity cost of time. Indeed, as LOG_INCOME_HH also includes non-labour income (e.g. rent) and income from other household members, the positive effect of a rise in income on the chance of taking part in sports is found to be higher for LOG_INCOME_HH than for LOG_INCOME_PERS.

The second research question relates to whether other leisure activities influence the sports expenditure decision. A look at the results for the larger sample using household income suggests that sports participation and other leisure are complementary activities (Burgham & Downward, 2005; Downward, 2007), as active (SC_ORG_2) and organising (SC_ORG_3) members of socio-cultural organisations spend more money on sports, and no negative effects of other activities are found. Nevertheless, for the smaller sample using personal income, sports expenditure is negatively influenced by watching TV (TV_2/TV_3) and cultural activities. The negative effect for TV viewing has also previously been identified (Dawson & Downward, 2013; Scheerder et al., 2011) and Roberts (2015) states that lower socioeconomic strata spend less money on all leisure categories except watching television. The findings for cultural activities are less obvious however. The negative relationship between cultural activities and sports participation sheds new light on the concept of consumption capital (Wicker et al., 2010), which is generated by the use of similar goods over a long period of time, and is expected to stimulate the consumption of related activities. Therefore, similar to Crompton (2015), these findings suggest that citizens consider sports participation and cultural activities to be substitutes for one another.

The previous findings seem to indicate that workers, when consuming sports participation, are determined by their choices for other leisure activities. Because this is less apparent in the model that uses household income, a possible explanation could be a lack of available free time. Nevertheless, the latter explanation contrasts with the finding that the overall time scarcity is not an issue. People who perform more household tasks (HH_WORK), experience more time-pressure (LEIS_SUBJ), have a job (JOB_2/JOB_3) or work more hours a week (PERC_FT) do not significantly spend less money on sports. The fact that overall time availability is not an issue in sports consumption, is in line with the findings of Hallmann and Wicker (2015). Based on all the results, it can be concluded that income is an important barrier in consuming sports, and a combined effect of time scarcity and tastes determines the decision to consume sports participation versus other leisure activities.

Finally, we also discuss the effects of the other sociodemographic, socioeconomic and sports-specific variables on sports expenditure. Women (SEX) are found to spend less money on sports participation, which is also consistent with previous research (e.g. Lera-López & Rapún-Gárate, 2005; Scheerder et al., 2011; Thibaut et al., 2016). Nevertheless, this conclusion only holds for the larger sample of individuals. An explanation can be found in the composition of the research population, as it only includes people who are in the labour force. Therefore, once individuals are actively involved in the labour force, the gender difference in spending behaviour apparently disappears. As people get older they spend less money on sports participation (AGE). This finding is also present for middle-aged labourers, but does not hold for workers who are in the last part of their working career. Education (EDUC) is found to positively influence sports consumption (see e.g. Lera-López and Rapún-Gárate, 2005, 2007; Scheerder et al., 2011; Wicker et al., 2010). Students also spend more on sports relative to those who only obtained a degree in primary education. The fact that education is not a significant

influencing factor for people who are in the labour force (right column of Table 5.2) indicates that this is possibly due to the fact that people who are in the labour force have a higher education on average when compared with the total sample. The more sports activities (SP_DIV) and minutes (SP_MIN) one practices, the more money they spend on sports. The significant effect of the sports-specific variables is straightforward and confirms that the amount of sports participation that is consumed and the money that is spent are closely related to each other, as suggested by economic theory (e.g. Downward et al., 2009, p. 66) and underpinned by experimental results (e.g. Scheerder et al., 2011).

6. Conclusion

The results demonstrate that income is a significant barrier in spending money on sports participation. More insight is given in the income-expenditure relationship by the calculation of income elasticities for different levels of income.

The effect of a rise in income on the probability of spending money on sports is relatively bigger for individuals with a lower personal labour and household income, than for individuals with a higher income. This finding has important implications for sports policy makers. First, given the effect on poverty rates as a result of the economic crisis, governments should carefully monitor the effects on sports participation rates. Second, it suggests that income-based segmentation of sports participants could turn out to be an efficient policy tool. Indeed, by lowering the monetary-burden for lower incomes, it can be expected that participation rates can be raised relatively efficiently, especially when compared with the current supply-driven subsidies that all sports participants benefit from. Another advantage of an income-dependent policy is that the focus on improving the chances for those who are socioeconomically deprived results in a more equal society, thereby increasing physical activity as demonstrated by Veal (2016). On the other hand, the finding that sports expenditure rises at a faster pace for higher income individuals, is interesting for sports enterprises. They should look for opportunities to raise profits by developing marketing strategies for certain specific (expensive) sports products and services that target higher income consumers.

The findings also demonstrate that, although income is an important determining factor of sports consumption, it is certainly not the only one. A combined effect of tastes and leisure-specific time scarcity also turns out to be an essential burden for spending money on sports. The latter is reflected by the finding that labourers the consumption of certain leisure activities (e.g. watching TV, attending cultural activities) is negatively related with sports consumption. Sports governing bodies need to be aware of this finding, as it suggests that policy actions in different leisure fields intervene with each other, and that consequently it is possible that they partially erase each other's impact. A possible solution could be to integrate different leisure activities such that multiple policy goals are achieved. For example, active leisure (e.g. cultural walking, city trips by bike, active museums) could be a time-efficient alternative for separately consuming both activities. Also, the results suggest that it could be interesting to investigate whether investing money in removing time-barriers is more effective than the current one-size-fits-all policy of reducing the price on the sports club-organised supply side, especially for higher income households for which the effect of income on the possibility to participate is lower. For example, a possible policy action could be to support employers that facilitate sports participation at work, thereby making it possible for employees to engage in sports during lunch time. Other possible actions could be to provide in sports facilities that also have childcare, active commuting, etc.

For commercial sports providers, the results give an idea how they can optimise their profit. Potential customers can be segmented based on their income. Although higher income citizens spend more money on sports, persuading people that have a lower income by means of price reductions is also a valid strategy to capture the consumer surplus.

An important limitation of the current study is that the consumption of sports and on non-sports activities (e.g. reading books) were not operationalised in the same way, as the former was expressed in expenses on sports, while for the latter only data about their frequency were available. It would for example also be interesting to calculate cross-price elasticities between expenses on sports participation, and expenditure on other leisure activities and non-leisure products and services.

Future research should also investigate the time-dimension of sports participation versus other leisure activities. Time-budget studies can for example include variables such as the time that is spent on different leisure activities, while including the time that is spent on working, sleeping, household tasks, etc. Second, for specific policy and management decisions, more research is needed regarding the effects of income on specific sports activities (e.g. soccer, running, etc.) and specific expenditure categories (e.g. membership fees, social costs, etc.). A final suggestion is that the current study focusses on individual and household characteristics. As demonstrated by Hoekman et al. (2016) it would also be interesting to include factors at the meso-level, such as the socioeconomic status of the neighbourhood.

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SECTION 3

NON AGGREGATED EXPENDITURE

CHAPTER 6
The Determinants and Income Elasticities of Direct and Indirect Expenditure Categories (Paper 3)

This chapter is submitted as a paper to an international peer-reviewed journal

Thibaut, E., Eakins, J., Vos, S., & Scheerder, J. (under review). The determinants and income elasticities of direct and indirect expenditure categories.

1. Abstract

Research question. The current study investigates the income elasticities and socioeconomic determinants of direct and indirect sports expenditure categories by means of a log normal hurdle regression.

Research methods. The data stem from a representative sample of 3005 Flemish families with school-aged children, gathered through a sports-specific survey. A log normal hurdle regression was used to calculate the determining factors and expenditure elasticities of expenditure on sports participation.

Results and findings. The results indicate that income, education and the age of the youngest child are positively related to almost all sports expenditure categories, while the number of family members and degree of urbanization are significant for only a number of the expenditure categories. The elasticity value of the direct sports expenses is smaller than is the case for indirect sports expenditure. Between the expenditure categories large differences exist, as relatively large elasticities are found for sports holidays, transport and sports food and drinks, as opposed to low values of sports events, sports club membership, entrance fees for sports infrastructure, sports camps, clothing, footwear and equipment.

Implications. The fact that income significantly influences all expenditure categories, demonstrates that further policy intervention is required to make sports consumption more accessible to lower income groups. Sports enterprises and policy makers need to be aware that negative income shifts have a more profound impact on the indirect expenditure categories, and that certain sports activities (e.g. participation events) are relatively more favoured by low income groups than is the case for sports club membership.

2. Introduction

Recent research indicates that more than one out of two European citizens are involved in active sports participation at least once a month (Scheerder et al., 2011), suggesting that the sports participation sector has become a significant economic industry. Estimates of the share of the sports sector in the total economy range from 1.5% till 3.0% (e.g. Andreff & Andreff, 2009; Taks & Késenne, 2000). Sport not only has direct economic effects, but it also has an important instrumental (economic) value, as it is an essential policy tool to reduce obesity and obesity-related health diseases.

For both the government (price reducing subsidies) and private sports providers (maximizing profit by segmenting) it is important to gain insight into the determinants of sports spending to quantify and predict the effect of their actions. Therefore, previous socioeconomic research has investigated the expenses that people make when taking part in sports, with a prime focus on aggregated forms of sports expenditure (e.g. Lera-López & Rapún-Gárate, 2005; 2007; Thibaut, Vos & Scheerder, 2014). Nevertheless, sports expenditure should also be investigated on a disaggregated level, as it is likely that different consumption patterns exist for different sports expenditure categories (Pawlowski & Breuer, 2012b). Indeed, certain studies demonstrate that significant differences are found between separate sports expenditure categories (Eakins, 2016; Pawlowski & Breuer, 2012a) and between different sports activities (e.g. Thibaut, Eakins, Vos & Scheerder, 2016; Wicker, Breuer & Pawlowski, 2010).

Although the studies of Eakins (2016) and Pawlowski and Breuer (2012a) analysed subcategories of sports expenditure, they are based on published data, meaning that the disaggregation in their research is constrained to reflect the categories of these non-sports-specific datasets (Downward, Dawson & Dejonghe, 2009). Also, these datasets do not allow for mapping the indirect sports expenses (e.g. sports food/drinks, transportation). The first aim of the current study is therefore to fill this gap in the literature, by using a sports-specific survey to investigate the influencing factors of nine direct sports expenditure categories on the one hand, i.e. membership expenditure (MEMB), participation in sports events (EVENT), entrance to sports infrastructure (ENTR), sports lessons (LESSON), sports camps for children (CAMP), sports holidays (e.g. skiing) (HOL), sports clothing (CLOTH), sports equipment (EQUIP), sports footwear (FOOTW), and three indirect sports expenditure categories on the other hand, i.e. sports-related travel expenses (TRANSP), sports related food and drinks (F&D) and social activities (SOCIAL).

Second, the current study aims to calculate income elasticities for the expenditure categories that are listed above, such that their income-expenditure-effects can be compared. For example, it would be interesting to differentiate between the products/services that are subsidised by the government (e.g. sports club membership fees, sport camps) versus the ones that are not. It is estimated that the Flemish government spends between €33 and €41 of direct subsidies per sport club member (Thibaut, Scheerder & Claes, 2015). Additionally, the government also financially supports sports camps and (co-)finances the construction of sports facilities (e.g. sports halls, soccer fields, swimming pools). By computing the elasticities of different expenditure categories, we can determine whether certain expenditure categories that are partially financed with governmental subsidies (i.e. membership fees, sports infrastructure, sports camps) are more accessible to lower/higher income groups.

A final contribution of the current study is the focus on expenditure by families with at least one school-aged child, which is in contrast with the majority of the studies that investigate individual expenditure by adults. The reason of the current focus is twofold. First, families with young children are often targeted by sports government, as studies demonstrate that children participate more often in sports if their parents were sports participants during their youth (Thibaut et al., 2014). Second, as children account for an important part in total sports consumption, it is remarkable that almost no sports-specific studies are found that include expenditure by non-adults. In line with the household production theory of Becker (1965), and with the sports studies based on household budget surveys that monitor national economies (e.g. Eakins, 2016; Pawlowski & Breuer, 2011, 2012a), the current study considers the household as the appropriate level for analysing sports expenditure.

3. Literature review

3.1. Conceptualization of sports expenditure

A wide variety of sports expenditure definitions have been used in the literature, as almost each study incorporates different classifications in what they define as 'sports expenditure'. These differences in conceptualisation could be one of the reasons (apart from for example cultural or sports policy differences) why sports expenditure studies find the sign and significance of expenditure-determinants relationship to vary.

First, Downward, Dawson and Dejonghe (2009) mention that a significant number of studies used official non-sports-specific 'overall expenditure' survey data to analyse household expenditure on sports (e.g. Dardis, Soberon-Ferrer & Patro, 1994; Løyland & Ringstad, 2009; Pawlowski & Breuer, 2011; 2012a). The main advantage of official survey data is that their purpose is not sports-specific, such that comparison with other non-sport categories is possible. A disadvantage is that the sports expenditure variable is pre-defined, thus researchers have less scope in specifying the expenditure variable and depend on the data availability (Downward, Dawson & Dejonghe, 2009; Eakins, 2016). As a consequence these studies conceptualise sports expenditure differently. Dardis, Soberon-Ferrer and Patro (1994) incorporate sports club subscription fees, sporting equipment and tickets to sporting events, Løyland and Ringstad (2009) mention expenditure on public facilities, equipment, transport and sports events, while Pawlowski and Breuer (2011; 2012a) focus on certain aspects of specific sports activities, such as entrance fees for swimming pools, membership fees for fitness centres and sports clubs, usage of ski lifts, etc. Finally, the four sports expenditure categories (i.e. sporting events attendance, sports participation costs, sports club subscriptions and fees to leisure classes) that are investigated in the study of Eakins (2016) represent the lowest level of disaggregation in the Irish household budget survey.

Second, a number of sports expenditure studies used data that were gathered by surveys specifically designed to question sports expenditure, allowing for more freedom in the formulation of the expenditure question(s) (Downward, Dawson & Dejonghe, 2009).

Késenne and Butzen (1987) and Késenne, Couder and De Maesschalck (1987) divided sports expenditure in two broad categories, i.e. direct expenditure and indirect expenditure. The direct expenditures are explicitly allied with sports practice (e.g. equipment, training and public facilities), while the indirect expenditures belong to other economic sectors, but could/should also be taken into account when they are consumed for sports purposes (e.g. transport, consumption of sports beverages and sports food, and the shadow price of time). This distinction is important, as in most published non-sports-specific datasets it is impossible to retrieve the indirect sports expenditure categories.

The sports expenditure conceptualization of Késenne and Butzen (1987) and Késenne, Couder and De Maesschalck (1987) has been applied and extended by a number of researchers. First, Taks and Késenne (2000) also investigate direct expenditure (membership and entrance fees, training, equipment) and indirect expenditure (travel, socializing, medical care and body care, and time), but they added questions about the expenditure on physical education and school sport, and on spectator sports. Second, Berret and Reimer (2005) applied a similar distinction between direct and indirect expenditure, although they named it primary expenditure (equipment, clothing, footwear, lessons, camps, sports holidays, membership fees, entrance fees of sports facilities) and secondary expenditure (travel, socializing,

medical, body care, insurance, child care, other). A significant difference with the aforementioned studies is that Berret and Reimer (2005) incorporate expenditure on amateur sports. Third, the study of Bloom, Grant and Watt (2005) includes the same categories (clothing, equipment, team fees and memberships, admissions, transportation, accommodation, food and beverage) in their definition, and this for three different kinds of sports consumers, namely sports participants, sports volunteers and sports spectators. Finally, Thibaut, Vos and Scheerder (2014) and Thibaut, Eakins, Vos and Scheerder (2016) made use of a similar categorisation as Késenne and Butzen (1987) and Késenne, Couder and De Maesschalck (1987).

Nevertheless, although sports-specific expenditure studies allow for the inclusion of indirect cost categories, certain studies opt to exclude them (e.g. van Bedaf & Pilgaard, 2014; Lera-López & Rapún-Gárate, 2005; 2007) or focus on just one expenditure category (e.g. sports apparel in the study of Scheerder, Vos & Taks, 2011). Other discrepancies include some studies that use passive sports expenditure, such as expenditure on magazines/books (Wicker, Breuer & Pawlowski, 2010), sports betting (van Bedaf & Pilgaard, 2014) and spectator sports (Bedaf & Pilgaard, 2014). In the current study these categories are excluded, as Lera-López and Rapún-Gárate (2011) demonstrate that it is better to investigate the consumption of top-level sports and sports participation separately, because both activities are influenced by different factors.

The wide variety of sports expenditure definitions listed above demonstrates that no agreement exists in the literature on which expenditure categories should be seen as sports expenditure, and which should not. The current study therefore focusses on an extensive number of sports expenditure categories. Because the current study – in contrast to previous disaggregated sports expenditure research – made use of a sports-specific survey, it was possible to conscientiously define the sports expenditure categories, and to also include indirect 'additional' expenditure categories that are normally absorbed in aggregated non-sports economic sectors.

3.2. Sociodemographic and socioeconomic determinants of household sports expenditure

Previous literature demonstrated that income had a clear positive influence on household (Dardis, Soberon-Ferrer & Patro, 1994; Eakins, 2016; Løyland & Ringstad, 2009; Pawlowski & Breuer, 2012a; Thibaut, Vos & Scheerder, 2014; Weagley & Huh, 2004) and on individual sports expenses (Bloom, Grant & Watt, 2005; Downward, 2007; Lera-López & Rapún-Gárate, 2007). Previous income and/or expenditure elasticity studies (e.g. Eakins, 2016; Løyland & Ringstad, 2009; Pawlowski & Breuer, 2012a) also included other socioeconomic variables than income, because otherwise the income elasticities would have been over-estimated (Løyland & Ringstad, 2009). The overall relationship between education and sports purchases appears to be positive for both the individual (Lera-López & Rapún-Gárate, 2005; 2007) and the head of household (Dardis, Soberon-Ferrer & Patro, 1994; Weagley & Huh, 2004), although Taks, Renson and Vanreusel (1999) found a negative connection. Also, Pawlowski and Breuer (2012a) obtained mixed results, while Thibaut, Scheerder and Vos (2014) demonstrated that households with a higher educated head of household have a significant higher probability of spending money on sports participation, but that once they decided to spend money on sports they spend smaller amounts.

The relationship between age and sports expenditure is equally as ambiguous, as some studies found positive (Taks, Renson & Vanreusel, 1999; Lera-López & Rapún-Gárate, 2007) or negative (Eakins, 2016) effects, or no relationship at all (Pawlowski & Breuer, 2011). Larger families are found to be bigger spenders of sports-related products (Pawlowski & Breuer 2012a; Taks, Renson & Vanreusel, 1999), although their expenditure per family member is lower than in smaller families (Thibaut et al., 2014). The more urbanised the residence of the participants, the higher sports expenditure (Eakins, 2016; Pawlowski & Breuer, 2011; 2012a), while no significant urban effect was found in the study of Thibaut et al. (2014). Finally, having younger children is negatively related to sports expenses (Downward, 2007; Eakins, 2016; Pawlowski & Breuer, 2012a; Thibaut et al., 2014).

In line with previous research, this study assumes that consumption is lower for groups that face more monetary and time (and biological) constraints. In other words, for every expenditure category it is hypothesised that income, education, family size, urbanization and the age of the youngest child positively influence sports expenditure, while the age of the head of household is negatively related (H1).

3.3. Income and expenditure elasticity estimates

Pawlowski and Breuer (2012a) studied the expenditure elasticities of a number of leisure categories. Apart from leisure services in general they also focused on 10 non-sport leisure activities and 7 sports activities (i.e. sports in general, swimming pool fees, sports event admission, dancing lessons, fitness, ski lift fees and sports club membership fees). Using German household data they found that all investigated sports activities are luxury goods based on Tobit type I calculations, but necessities based on Heckman (Tobit Type II) calculations. Therefore, they suggest that the absolute elasticity values should be interpreted cautiously. Løyland and Ringstad (2009) found that in Norway the household demand for sports evolved from an income elastic good in 1986 to an income inelastic good in 2002. On the contrary, Irish data indicated that sports participation should be typified as a luxury good (Eakins, 2016). Based on leisure (sport and non-sport) expenditure data, Weaghley and Huh (2004) classified leisure expenditure as a luxury good. The fact that the above income elasticity values do not paint a coherent picture can be explained by differences in the research context of the studies, and in the zero-regression methods that are used (Pawlowski and Breuer, 2012a). Moreover, overall sports expenditure is operationalised differently and includes different expenditure categories.

The theory of Becker (1965) gives an idea about which expenditure categories can be expected to have high (or low) income elasticities, and has often been applied for calculating sports elasticities (e.g. Eakins, 2016; Løyland & Ringstad, 2009). The theory removes the distinction between production and consumption, by assuming that household economic decisions such as sports consumption are 'produced' by household inputs, i.e. income, time and human capital. Market goods are thus consumed indirectly through the pursuit of utility maximisation (Stigler & Becker, 1977). Becker's theory (1965) is an extension of the income-leisure trade-off, that assumes that with a rising wage rate, economic agents not only have more money to spend on sports ('income' effect), but also a higher opportunity cost of time ('substitution effect) (Downward & Riordan, 2007). This substitution effect results in a shift towards 'work' instead of 'free time', and thus in a reduced spending on sports participation. Based on these paradox substitution and income effects, it is assumed that lower income families cut down on sports services that cost a lot of money per time unit, while this is less the case for sports products that

are essential to participate in sports. In line with the latter, it is hypothesised that the services sports lessons and sports holiday have higher income elasticities when compared to sports apparel (clothing, footwear, equipment) (H2) and that the indirect expenditure categories have higher income elasticities than the direct expenditure categories (H3).

4. Data

The data stem from a detailed sports-specific study that has been carried out every ten years since 1969, although only in the last version of 2009 also expenditure questions were incorporated (Table 6.1). The survey was distributed in Flanders (the Dutch speaking part of Belgium) to a sample of school-aged children (6-18 years old), that is representative for school-system, residence, urbanization, secondary versus primary school, age of child, and gender of child. The children were asked to fill out the questionnaire together with their parents, and this for every member of the family (adults and children). This survey method is designed to gather reliable data about sports expenditure by children, as it is often unclear who (parents or children) has the best insight in their sports expenses. Indeed, despite the fact that (families with) children are both an essential part of the (sports participation) economy and an important target group of the sports policy, they are neglected in the sports-specific expenditure datasets that we know of.

TABLE 6.1
Descriptive statistics of the independent variables

		Mean	Std. Dev.	Min.	Max.
Income		2904.8	1081.7	0	5000
Age HOH	*Younger than 36y*	0.034	0.182	0	1
	36y-40y	0.155	0.362	0	1
	41y-45y	0.337	0.473	0	1
	46y-50y	0.313	0.464	0	1
	>50y	0.160	0.367	0	1
Urbanization of residence	*Rural community*	0.250	0.433	0	1
	Municipality	0.233	0.423	0	1
	City	0.517	0.500	0	1
Education HOH	*Low*	0.208	0.406	0	1
	Middle	0.332	0.471	0	1
	High	0.460	0.498	0	1
Family size		4.246	1.118	1	11
Age youngest child	*Younger than 6y*	0.034	0.182	0	1
	6y-12y	0.155	0.362	0	1
	13y-18y	0.337	0.473	0	1

Although 3004 families (response rate 67%) returned the questionnaire, some of them did not answer certain specific question(s). For example, only 2150 families recorded their income, an essential variable in this study. Of the families who answered the income question, 360 families did not fill out any of the expenditure categories of sports participation, and were thus treated as zero expenditure (Humphreys, 2013). The questionnaire asked each family member to fill out the amount of money that they had spent on active sports participation during the previous 12 months. In the questionnaire, expenses on spectator sports, commuter traffic by bike or by foot and physical education were explicitly excluded, because the focus is on purchases related to recreational, active sports use. With regard to the expenditure categories, both direct and indirect sports expenditures are included, as suggested in the literature section. For each

sports discipline that is practiced by one of the family members, expenses on twenty different expenditure categories had to be filled out. If an expenditure category is purchased by 150 families or less, it is grouped into the 'other' category. In Table 6.2 a detailed definition of each expenditure category is given, along with basic descriptive statistics.

Although 3004 families (response rate 67%) returned the questionnaire, some of them did not answer certain specific question(s). For example, only 2150 families recorded their income, the prime independent variable in this study. Of the families who answered the income question, 360 families did not fill out any of the expenditure categories of sports participation, and were thus treated as zero expenditure (Humphreys, 2013). The majority of these 360 households also left the sports duration and expenditure questions blank, but yet filled out the 'standard' questions (e.g. sex, age, etc.). Additional analyses demonstrate that the non-respondents do not significantly differ from the respondents for the independent variables that are used in the current study (age HOH of household, urbanization, education HOH, family size, age youngest child). The sample is thus found to be representative for the independent variables that are included in the regressions.

The questionnaire asked each family member to fill out the amount of money that they had spent on active sports participation during the previous 12 months. In the questionnaire, expenses on spectator sports, commuter traffic (cycling/walking) and physical education were explicitly excluded, because the focus is on purchases related to recreational, active sports use. With regard to the expenditure categories, both direct and indirect sports expenditures are included, as suggested in the literature section. For each sports discipline that is practiced by one of the family members, expenses on twenty different expenditure categories had to be filled out. If an expenditure category is purchased by 150 families or less, it is grouped into the 'other' category. In Table 6.2 a detailed definition of each expenditure category is given, along with basic descriptive statistics.

TABLE 6.2
Descriptive statistics of the expenditure categories for households who fill out their family income (N=2150), Means and SDs with the zeros included

Expenditure Category	Definition	Abb.	Mean (€)	SD (€)	Proportion of Households with Positive Expenditures (%)
Total expenditure	Sum of all direct and indirect expenditure categories, and the 'other expenditure' category	TOT	1334.8	36.3	83.3
Direct Expenditure	Sum of the below direct expenditure categories	DIR	1033.0	27.2	82.3
Sports club membership	Annual fee to become part of a sports/fitness club	MEMB	286.9	8.1	72.3
Subscription for tournaments/games/ events	Registration fee to take part in sports events	EVENT	16.7	2.4	15.8
Entrance fees for usage of sports infrastructure	Admission fee to swimming pool, sports hall, etc. not included in sports club membership	ENTR	48.0	4.0	20.8
Lessons/training assistance	Assistance (e.g. dancing lessons, personal trainer, ski monitor), that is not included in sports club membership	LESSON	68.4	5.9	16.0
Sports camps	Short sports holiday, mostly organized for children by governmental organizations during 5 days	CAMP	58.0	3.5	22.0
Sports holidays	Holidays on which sports participation is the major purpose	HOL	53.0	6.1	7.9
Purchase of sports clothing	All kinds of sports clothing (e.g. shirts, socks, shorts, etc.)	CLOTH	194.4	6.9	61.9
Purchase of sports footwear	All kind of sports shoes	FOOTW	142.4	4.5	59.1
Purchase of sports equipment	E.g. tennis racket, surfboard, bike, heart rate monitor, etc.	EQUIP	165.2	9.1	34.7
Indirect expenditure	Sum of the below indirect expenditure categories	IND	222.9	9.9	59.8
Transportation by car	Number of kilometres multiplied by cost per kilometre	TRANSP	85.7	4.3	47.1
Food/drink consumption before/during/after	Sports food and drinks, but also (non)alcoholic drinks and food afterwards	F&D	109.4	6.4	42.5
Extra-sportive social activities	E.g. tombola, social activities to (financially) support sports clubs, etc.	SOCIAL	27.8	2.0	20.2
Other expenditure	Permissions (e.g. hunting, fishing), non-recurring fee for first subscription in a club/organization, rental of sports apparel, public transport, medical care, additional insurance, additional childcare, other)	OTHER	78.9	36.3	34.6

5. Method

A particular consideration when modelling household expenditures is the presence of zero values. OLS estimation using both zero and positive observations would produce estimates that are biased as well as inconsistent. The Tobit Model (Tobin, 1958) was the original model developed to analyse dependent variables with this characteristic and has been applied on household sports consumption by Dardis, Soberon-Ferrer and Patro (1994), Lera-López and Rapún-Gárate (2005) and Pawlowski and Breuer (2012a). The standard Tobit model is estimated using maximum likelihood methods. The log likelihood function for this estimation is:

$$\mathrm{LL}_{\mathrm{Tobit}} = \sum_0 \ln\left(1 - \Phi\left(\frac{x\beta}{\sigma}\right)\right) + \sum_+ \ln\left(\frac{1}{\sigma}\phi\left(\frac{y - x\beta}{\sigma}\right)\right) \quad (1)$$

where "0" indicates summation over the zero observations in the sample ($y_i = 0$) and "+" indicates summation over positive observations ($y_i > 0$). Φ and ϕ are the cumulative distribution function for a standard normal random variable and standard normal probability density functions (cdf and pdf), respectively.

The Tobit model assumes that households with zero levels of expenditure would like to purchase the good but cannot due to current prices and income (corner solution). This may be suitable in this research context given the focus on income as a financial constraint to sports consumption. On the other hand the corner solution assumption could be restrictive as zeros may come from the individual's deliberate choice to abstain from consuming the good. In the context of this study it is also plausible that some households may not engage in a sporting activity at any level of prices and income. Another limitation of the Tobit model is that it assumes the same variables affect the participation decision as well as the consumption decision and moreover with the same sign. The latter contrasts with the results of previous sports expenditure research (e.g. Pawlowski & Breuer, 2011; Thibaut, Vos & Scheerder, 2014). Humphreys and Ruseski (2015) also demonstrated that income has an opposite effect on the decision to spend time on sports versus the amount of time that is spent.

Consequently, the current study opts for a bivariate generalization to the Tobit model, that cover two types of specifications, hurdle models and sample selection models (Heckman's selectivity model). Both have been used extensively in the literature on household sports consumption. Downward and Riordan (2007), Pawlowski and Breuer (2011; 2012a) and Thibaut, Vos and Scheerder (2014) estimate Heckman selectivity models in their studies while Weagley and Huh (2004) estimate hurdle models.

According to Humphreys, Lee and Soebbing (2010) and Jones (2000) sample selection models deal with infrequency of purchase and sample selection issues. As the focus is on family expenditure on all sports activities, and because of the extensive reference period of one year, it is assumed that only a very small number of zeros should be attributed to infrequency of purchase. On the other hand in hurdle (and Tobit) models, zeros are treated as genuine zeros, representing actual levels of consumption, because the cost of purchase is too high (based on current prices and income i.e. a corner solution) or because individuals

abstain from purchasing the good. On the basis that zeros in our data more plausibly represent genuine zeros, our modelling approach will proceed with the estimation of hurdle models.

The development of hurdle models is credited to Cragg (1971). In these models the probability of positive expenditure is determined by a probit model and the level of is determined by a log normal expenditure regression model. Following Wooldridge (2010), the log likelihood function for the log normal hurdle model of Cragg is given as follows:

$$\mathrm{LL}_{\text{Log Norm DH}} = \sum_0 \ln\left(1 - \Phi(\mathrm{w}\alpha)\right) + \sum_+ \ln\left(\Phi(\mathrm{w}\alpha)\frac{1}{\sigma}\phi\left(\frac{\ln(\mathrm{y}) - \mathrm{x}\beta}{\sigma}\right)\right) \quad (2)$$

, where $w\alpha$ are the coefficients and variables in the 1st part of the hurdle model and $x\beta$ are the coefficients and variables in the 2nd part of the hurdle model. The theoretical choice for a log normal hurdle approach can also be confirmed empirically. First, the Heckman models can be ruled out because estimates show the inverse mills ratio to be insignificant for almost every expenditure category. Second, a comparison between the log normal Cragg model and the Tobit model is difficult to perform as they do not nest one another. In this instance a non-nested approach to examining the difference in the log likelihoods of each model is required. The Vuong test (Vuong, 1989) is a commonly applied (e.g. Aristei & Pieroni, 2008; Humphreys, 2013; Thibaut, Vos & Scheerder, 2014) non-nested test. The test is based on the following test statistic:

$$\mathrm{V} = \frac{\sum_{\mathrm{i}=1}^{\mathrm{n}}\left[\ln f(\mathrm{y_i}|\mathrm{x_i};\,\hat{\theta}) - \ln g(\mathrm{y_i}|\mathrm{x_i};\hat{\pi})\right]}{\sqrt{\mathrm{n}}\hat{\mathrm{w}}} \sim \mathrm{N}(0,1) \quad (3)$$

where $\sum_{\mathrm{i}=1}^{\mathrm{n}}\left[\ln f(\mathrm{y_i}|\mathrm{x_i};\,\hat{\theta}) - \ln g(\mathrm{y_i}|\mathrm{x_i};\hat{\pi})\right]$ is the sum of the difference in the log likelihoods of two competing models evaluated at each observation and $\hat{\mathrm{w}}$ is the estimated standard error of this expression[4]. If the test statistic is not statistically significantly different from zero then the two competing models are equivalent in terms of model fit. A statistically significant and positive test statistic suggests that $f(\mathrm{y_i}|\mathrm{x_i};\,\hat{\theta})$ is the better model. A statistically significant and negative test statistic suggests that $g(\mathrm{y_i}|\mathrm{x_i};\hat{\pi})$ is the better model.

Elasticities for the probability of a positive expenditure (e_j^P) and the conditional level of expenditure (e_j^{CC}) can be calculated as follows. Firstly we define $P[y_i > 0|\, x]$ as representing the probability of a positive value of y_i for values of the explanatory variables, i.e. the first stage dependent variable and $E[y_i \mid y_i > 0, x]$ as the expected value of y_i for values of the explanatory variables, x, conditional of $y_i > 0$ i.e.

4. Where the estimated variance can be written as

$$\hat{w}^2 = \frac{1}{n}\sum_{i=1}^{n}\left[\ln f(y_i|x_i;\,\hat{\theta}) - \ln g(y_i|x_i;\hat{\pi})\right]^2 - \left(\frac{1}{n}\sum_{i=1}^{n}\left[\ln f(y_i|x_i;\,\hat{\theta}) - \ln g(y_i|x_i;\hat{\pi})\right]\right)^2$$

the second stage dependent variable. Table 6.3 presents the formulas for the expected values and marginal effects of these expressions.

The marginal effect for the unconditional expectation, $E[y_i \mid x]$ or overall effect of the dependent variable can be derived using McDonald and Moffitt's (1980) decomposition i.e.

$$E[y_i \mid x] = P[y_i > 0 \mid x] * E[y_i \mid y_i > 0, x] \tag{4}$$

Applying the product rule of differentiation to equation (4) gives:

$$\frac{\partial E[y_i|x]}{\partial x_j} = \frac{\partial P[y_i>0|x]}{\partial x_j} * E[y_i|y_i > 0, x] \; + \; \frac{\partial E[y_i|y_i>0,x]}{\partial x_j} * \partial P[y_i > 0|x] \tag{5}$$

Multiplying both sides by $x_j / E[y_i \mid x]$ and tidying gives,

$$\frac{\partial E[y_i|x]}{\partial x_j} * \frac{x_j}{E[y_i|x]} = \frac{\partial P[y_i>0|x]}{\partial x_j} * \frac{E[y_i|y_i>0,x]}{E[y_i|x]} x_j \; + \; \frac{\partial E[y_i|y_i>0,x]}{\partial x_j} * \frac{\partial P[y_i>0|x]}{E[y_i|x]} x_j \tag{6}$$

which using equation (4) equals,

$$\frac{\partial E[y_i|x]}{\partial x_j} * \frac{x_j}{E[y_i|x]} = \frac{\partial P[y_i>0|x]}{\partial x_j} * \frac{x_j}{P[y_i>0|x]} \; + \; \frac{\partial E[y_i|y_i>0,x]}{\partial x_j} * \frac{x_j}{E[y_i|y_i>0,x]} \tag{7}$$

that is, the elasticity for the unconditional expectation of the dependent variable (e_j) is equal to the sum of the elasticities for the probability of a positive expenditure (e_j^P) and the conditional level of expenditure (e_j^{CC}).

TABLE 6.3
Expected Values and Marginal Effects of the Dependent variable, Log Normal Hurdle model and Tobit model

	Log Normal Hurdle	**Tobit**
Probability of a Positive Purchase, $P(y_i > 0\|x)$	$\Phi(w\alpha)$	$\Phi\left(\frac{x\beta}{\sigma}\right)$
Conditional Level of Consumption, $E(y_i\|y_i > 0, x)$	$exp(x\beta + \sigma^2/2)$	$x\beta + \sigma\frac{\phi\left(\frac{x\beta}{\sigma}\right)}{\Phi\left(\frac{x\beta}{\sigma}\right)}$
Marginal Effect on Probability of a Positive Purchase, $\frac{\partial P[y_i>0\|x]}{\partial x_j}$	$\beta_j \phi(w\alpha)$	$\frac{\beta_j}{\sigma}\phi\left(\frac{x\beta}{\sigma}\right)$
Marginal Effect on the Conditional Level of Consumption, $\frac{\partial E[y_i\|y_i>0,x]}{\partial x_j}$	$\beta_j exp(x\beta + \sigma^2/2)$	$\beta_j\left(1 - \frac{\phi\left(\frac{x\beta}{\sigma}\right)}{\Phi\left(\frac{x\beta}{\sigma}\right)}\left[\frac{x\beta}{\sigma} + \frac{\phi\left(\frac{x\beta}{\sigma}\right)}{\Phi\left(\frac{x\beta}{\sigma}\right)}\right]\right)$

6. Results

The results in Table 6.4 represent the determinants of the two parts (probability of spending money and the amount of money that is spent) of the log normal hurdle model. Looking first at the sociodemographic variables for TOT, it is found that income and education positively influence the probability of consuming sports, while living in a city and the number of family members have a negative influence. Income, education and the age of the youngest child are positively related to the level of consumption on TOT.

The age of the head of household has a negative effect on the probability of spending money on TRANSP, while no significant age effects were found for the other expenditure categories. Households that live in a more urbanised area have a lower probability of spending money on DIR, IND, MEMB, EVENT, CLOTH, FOOTW, F&D, while they also spend lower amounts of money on IND, TRANSP and F&D. Education is positively related to the probability of a positive expenditure for almost all expenditure categories (except for HOL), but this variable has no positive effect on the level of consumption except for CAMP, and even a negative effect on F&D is found. When looking at the second part of the log normal hurdle model, it is found that households with more family members spend higher amounts of money on MEMB, CAMP, CLOTH, FOOTW, and lower amounts on HOL, TRANSP and F&D. When all children are older than six years, this positively affects the probability of a positive expenditure on EVENT, EQUIP and F&D, while this also positively influences the amount that is purchased of MEMB, CLOTH, FOOTW and EQUIP.

The positive relationship between income and the probability of spending money and/or the amount of money that is spent on all expenditure categories indicates that higher income families are bigger sports consumers. Total income elasticities are calculated by the summation of the elasticities of the first and second part of the log normal hurdle model. When controlling for the above-listed socioeconomic and sociodemographic variables, an income elasticity of +1.477 is found for overall expenditure on sports participation. The income elasticities of the different expenditure categories differ significantly from each other, with a higher value for IND (+1.728) than for DIR (+1.379). Certain expenditure categories have relatively high elasticity values, such as TRANSP (+1.829), HOL (+1.568), F&D (+1.486) and LESSON (+1.224). For other expenses such as CLOTH (+1.095), EQUIP (+0.979), CAMP (+0.969), MEMB, (+0.938), ENTR (+0.857), SOCIAL (+0.830), FOOTW (+0.739) and especially EVENT (+0.286) the income elasticities are much lower.

TABLE 6.4

Regression results and elasticities for overall sports expenditure and 12 sports expenditure categories

	TOT		DIR		MEMB		EVENT		ENTR		LESSON	
	LNH1 (N=1936)	LNH2 (N=1628)	LNH1 (N=1936)	LNH2 (N=1605)	LNH1 (N=1936)	LNH2 (N=1423)	LNH1 (N=1936)	LNH2 (N=321)	LNH1 (N=1936)	LNH2 (N=419)	LNH1 (N=1936)	LNH2 (N=319)
Income	0.69***	0.79***	0.64***	0.74***	0.59***	0.35***	0.35***	-0.07	0.42***	0.44	0.59***	0.63*
Age HH (<35=ref.)												
36-40Y	0.08	0.00	0.04	-0.01	-0.13	0.03	-0.00	-0.02	-0.13	0.25	0.20	0.52
41-45Y	0.23	0.13	0.18	0.09	-0.02	0.18	-0.02	0.18	-0.09	0.47	0.18	0.80
46-50Y	0.29	0.21	0.23	0.21	0.00	0.21	-0.05	0.27	-0.13	0.57	0.20	0.77
>50Y	0.18	0.02	0.12	-0.01	-0.11	0.20	-0.02	-0.23	-0.35	0.48	0.07	0.94
Urbanization (rural community=ref.)												
Municipality	-0.17	-0.07	-0.18	-0.04	-0.12	0.11	-0.17	-0.02	0.02	-0.16	-0.19	-0.28
Big city	-0.28**	-0.09	-0.28**	-0.08	-0.26***	0.07	-0.18*	0.04	-0.02	-0.08	-0.16	0.02
Education HH (low=ref.)												
Middle	0.28***	0.16	0.38***	0.12	0.29***	0.02	0.32**	0.18	0.15	-0.06	0.30**	0.21
High	0.55***	0.32***	0.59***	0.26	0.43***	0.07	0.42***	0.16	0.46***	0.17	0.40***	0.32
Number of family members	-0.08*	0.05	-0.07*	0.06	-0.05	0.17***	0.01	0.04	-0.03	0.03	-0.03	-0.08
Age youngest child (<6Y=ref.)												
6-12Y	-0.00	0.24**	-0.01	0.26**	0.06	0.27***	0.15	-0.37	0.03	-0.26	-0.01	-0.06
13-18Y	-0.09	0.38***	-0.09	0.36***	-0.05	0.13	0.31*	-0.12	-0.06	-0.36	-0.10	-0.47
Constant	-4.36	-0.16	-4.09	0.10	-3.9***	1.63**	-4.12***	4.07	-4.11***	0.65	-5.89***	-0.30
Elasticity	0.686***	0.791***	0.642***	0.737***	0.589***	0.349***	0.348***	-0.072	0.420***	0.437	0.594***	0.632**
Total elasticity	1.477		1.379		0.938		0.286		0.857		1.224	

Note. *p<.05. **p<.01. ***p<.001.

TABLE 6.4

Regression results and elasticities for overall sports expenditure and 12 sports expenditure categories (continued)

	CAMP		HOL		CLOTH		FOOTW		EQUIP	
	LNH1 (N=1936)	LNH2 (N=439)	LNH1 (N=1936)	LNH2 (N=158)	LNH1 (N=1936)	LNH2 (N=1225)	LNH1 (N=1936)	LNH2 (N=1177)	LNH1 (N=1936)	LNH2 (N=688)
Income	0.61***	0.35**	0.66***	0.91**	0.70***	0.39***	0.57***	0.16	0.69***	0.29***
Age HH (<35=ref.)										
36-40Y	0.15	-0.12	-0.22	-0.01	0.11	0.02	-0.12	0.02	0.07	0.20
41-45Y	0.34	0.29	-0.10	0.44	0.17	0.17	0.02	-0.08	0.18	0.32
46-50Y	0.38	0.31	0.14	0.39	0.15	0.23	0.11	0.25	0.20	0.38*
>50Y	0.08	0.54	/	/	-0.11	0.31	-0.11	0.04	0.00	0.60
Urbanization (rural community=ref.)										
Municipality	-0.11	0.07	-0.15	-0.16	-0.14	0.01	-0.07	0.01	-0.15	-0.01
Big city	-0.01	0.00	-0.23	-0.03	-0.24***	-0.05	-0.06	-0.13	-0.20*	-0.04
Education HH (low=ref.)										
Middle	0.31**	0.38*	-0.02	-0.42	0.34***	-0.04	0.12	0.03	0.14	0.01
High	0.49***	0.37*	0.21	-0.25	0.57***	-0.04	0.32***	-0.25	0.35***	0.01
Number of family members	-0.03	0.10*	-0.05	-0.30*	-0.03	0.07*	-0.03	-0.02	-0.03	0.12***
Age youngest child (<6Y=ref.)										
6-12Y	0.15	0.2	-0.05	0.11	0.13	0.08	-0.04	-0.11	0.20*	0.13
13-18Y	-0.2	0.27	0.06	0.24	0.14	0.22*	0.13	0.21	0.29*	0.37***
Constant	-6.14***	1.14	-6.39	-0.24	-5.51***	1.64*	-5.0***	4.31***	-5.44***	1.81**
Elasticity	0.615***	0.354***	0.662***	0.906***	0.704***	0.391***	0.580***	0.159	0.687***	0.292***
Total elasticity	0.969		1.568		1.095		0.739		0.979	

Note. *p<.05. **p<.01. ***p<.001.

TABLE 6.4
Regression results and elasticities for overall sports expenditure and 12 sports expenditure categories (continued)

	IND		TRANSP		F&D		SOCIAL	
	LNH1 (N=1936)	LNH2 (N=439)	LNH1 (N=1936)	LNH2 (N=935)	LNH1 (N=1936)	LNH2 (N=844)	LNH1 (N=1936)	LNH2 (N=411)
Income	0.80***	0.92***	0.81***	1.02***	0.56***	0.92***	0.61***	0.22
Age HH (<35=ref.)								
36-40Y	0.28	-0.17	0.45*	-0.36	-0.06	0.15	0.00	-0.27
41-45Y	0.21	0.226	0.41*	0.03	0.05	0.27	0.16	-0.04
46-50Y	0.25	0.19	0.53*	0.08	-0.00	0.25	0.21	-0.24
>50Y	-0.06	0.29	0.20	0.31	-0.28	0.39	-0.02	-0.18
Urbanization (rural community=ref.)								
Municipality	-0.20*	-0.43**	-0.14	-0.50**	-0.18*	-0.55**	-0.10	-0.15
Big city	0.37*	-0.26	-0.14	-0.44**	-0.05	-0.27	-0.05	-0.05
Education HH (low=ref.)								
Middle	0.20*	-0.08	0.15	0.15	0.18*	-0.47*	0.17	0.08
High	0.38***	0.02	0.33***	0.21	0.22*	-0.35	0.26*	0.02
Number of family members	-0.05	-0.11	-0.04	-0.19*	-0.06	-0.16*	-0.01	0.07
Age youngest child (<6Y=ref.)								
6-12Y	0.12	0.12	0.15	0.02	0.08	-0.03	-0.01	0.16
13-18Y	0.29*	0.34	0.21	0.08	0.35**	0.01	0.00	0.31
Constant	-6.33***	-2.37	-6.97***	-3.51	-4.57***	-1.98	-5.86***	2.40
Elasticity	0.805***	0.923***	0.810***	1.019***	0.561***	0.925***	0.608***	0.222
Total elasticity	1.728		1.829		1.486		0.830	

Note. *p<.05. **p<.01. ***p<.001.

7. Discussion

The positive income effect on sports expenditure is in line with previous research (Dardis, Soberon-Ferrer & Patro, 1994; Downward, 2007; Lera-López & Rapún-Gárate, 2007; Løyland & Ringstad, 2009; Pawlowski & Breuer, 2012a; Thibaut, Vos & Scheerder, 2014; Weagley & Huh, 2004). The calculation of the income elasticities gives insight in the magnitude of the income-expenditure effect.

In general, the results are in line with H3 as the elasticities of IND are higher than the ones of DIR. The results also confirm H2 that the elasticities of services HOL and LESSON are bigger than is the case for EQUIP and FOOTW (and also CLOTH). When looking at the results, it can be concluded that the income elasticities of goods and services that could be categorised as 'mandatory' for sports participation (e.g. DIR, FOOTW, EQUIP, CLOTH, ADM) appear to be lower. Sports participation would be difficult without these goods and services. For example, sports clothing, equipment and access to infrastructure are necessary if one chooses to practice a specific sports activity.

It is also noteworthy to consider the expenditure categories that are largely subsidised by government (CAMPS, MEMB), as they tend to have relatively low income elasticity values. The Flemish government spends between €33 and €41 of direct subsidies per sports club member (Thibaut, Scheerder & Claes, 2015), even without taking the (indirect) subsidies on sports infrastructure into account. Put differently, a Flemish family spends on average €287 a year on MEMB (Table 6.2), which could be considered as relatively low if one knows that training assistance, access to sports infrastructure and sometimes also sports equipment and clothing are incorporated in this fee. When compared to the other expenditure categories, the total elasticity value of MEMB is than the one of LESSON, although the effect of income on the probability of spending money on MEMB or LESSON is more or less the same. It is also remarkable that the consumption of sports events is less sensitive for income reductions, certainly because they are often organised without subsidies.

All forms of 'extra' training assistance (i.e. HOL, LESSON), and goods that are not 'necessarily' needed when taking part in sports (i.e. TRANSP, F&D) have higher elasticity values. HOL, LESSON and TRANSP are expected to enhance the sports consumption experience/efficiency. This finding is in line with the household production theory of Becker (1965), as with rising wage rate, the opportunity cost of free time becomes higher, thereby stimulating people to use their free time more efficiently.

As indicated above, the overall elasticity values in this research consist of two separate elasticity values, namely the probability of a positive purchase, and the conditional level of consumption. The 0.686 and 0.791 elasticity values of TOT indicate that lower income families face a hurdle to both the decision to spend money on sports participation, and the amount that is spent. The differences between these two values are more striking when the different expenditure categories are analysed. For example, lower income people face a relatively high burden for spending money on MEMB, CAMPS, CLOTH, EQUIP, FOOTW (in relation to the amount of money that is spent), while the opposite goes for HOL, F&D, TRANSP. When these results are compared with overall elasticity values (Salotti et al., 2015), remarkable differences are found. In the study of Salotti et al. (2015) for the EU27 overall food and transport expenses have for example very low elasticities compared to other categories (clothing, recreation, etc.), while the elasticity values for F&D and TRANSP in the current study are relatively high compared to other sports expenses.

A look at variables other than income demonstrates that H1 can be partially confirmed, as education and having older children (and income as indicated above) positively influence TOT, DIR and IND. The positive effect of education on sports expenditure is analogous to previous research (Dardis, Soberon-Ferrer & Patro, 1994; Lera-López & Rapún-Gárate, 2007; Thibaut, Vos & Scheerder, 2014). The non-significant relationship between age and TOT, DIR and IND could stem from the relative low variation in the age of the head of household as all families have school-aged children. Consequently, for the majority of these parents age is not (yet) a constraint consuming sports. The negative effect of urbanization is opposite to what one would expect. A possible explanation for the latter is the fact that Flanders is a very densely populated region, such that living outside the city centre does not necessarily diminishes the sporting opportunities.

A number of differences can be found between the determining factors of each expenditure category. First, a negative relationship is found between the number of family members and the probability of spending money on TOT, and on the amount of money that is spent on TRANSP and F&D, which is in line with Scheerder, Vos and Taks (2011). Nevertheless, family size has a positive effect on MEMB, CAMPS, CLOTH, FOOTW (see also Taks, Renson & Vanreusel, 1999; Pawlowski & Breuer, 2012a). Second, households with younger children are found to spend less money on sports participation (see also Downward, 2007; Pawlowski & Breuer, 2011, Thibaut, Vos & Scheerder, 2014), although no significance is found for categories that refer to all kinds of training (LESSON, CAMPS, HOL), and for SOC and TRANSP. Finally, the age of the HOH has a positive significant effect on TRANSP, but not on the other expenditure categories.

8. Conclusion

The current study demonstrates that income has a significant effect on sports expenditure, but that the magnitude (elasticity) of this effect differs between the expenditure categories. When analysing sports expenditure, it is therefore important to take into account that sports expenditure consists of a large variety of sports goods and services (e.g. Eakins, 2016; Pawlowski & Breuer, 2011). Therefore, literature would benefit from more non-aggregated sports expenditure research. Also, aggregated sports expenditure (and sports participation) research should clearly formulate the expenditure categories that are included, and the ones that are not. The results of the current study suggest that sports expenditure studies that include only direct expenditure categories tend to have lower overall income elasticity values compared to studies that also account for indirect sports expenditure.

The results of this study posit the following policy implications. First, the high probabilities of spending money on the different expenditure categories demonstrate that further policy intervention is required to make sports participation more accessible to all income groups. A potential policy action could be to segment households in higher and lower income groups, and to reduce the price of certain mandatory sports products/services for the latter group. Second, the overall income elasticity of the subsidised CAMP and MEMB is lower than the elasticity of LESSON. Nevertheless, the income elasticities are still relatively high when compared with for example EVENT. Government should not merely focus their attention towards CAMP and MEMB to increase sports participation among the lower income groups. Indeed, the income elasticities demonstrate that families who are low on income face a significant burden in consuming sports club membership and sports camps. Alternatively, policy makers should also include other policy tools such as promoting the income-independent sports

products/services EVENT and non-club-organised sports participation. Third, we suggest, in line with the previous two remarks, to make sports participation more accessible to lower income groups by for example donating the sports funding directly to lower income families, instead of only subsidizing sports clubs, sports camps and sports infrastructure. Sports policy makers can for example give 'Sports Checks' (similar to EcoChecques and Meal vouchers) to these families, that can be spent on predefined sports products and services such as sports club membership, sports apparel, or on other direct sports expenditure categories. Finally, the results of this study suggest that commercial sports providers should focus on higher income families for certain services (e.g. sports holiday, private lessons), while for the majority of the sports products and services they should target the whole (sports-active) population. Another strategy could be to lower the prices of the services that have high income elasticities (e.g. sports holiday, sports camps, sports lessons) by creating cheaper and innovative offers, such that these services become available for families with lower incomes.

A drawback of the current study is that the questionnaire contains solely sports expenditure data, and no information about other (non-leisure) expenditure. Therefore, it is difficult to calculate other elasticities (e.g. expenditure elasticities, cross-price elasticities). We also suggest to check the results for individual expenditure, as the current results are not necessarily transferable to individual expenditures, nor to families without school-aged children. It will also be interesting to compare the results of the current study with the results of 2019, when the next phase of this household sports participation census will be held. Finally, based on the current data and research techniques, it is not possible to investigate potential causality. Future research could investigate to what matter certain variables (e.g. education) influence sports expenditure, or whether the direction of this relationships are the other way around.

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CHAPTER 7
Time and Money Expenditure in Sports Participation: The Role of Income in Consuming the Most Practiced Sports Activities in Flanders (Paper 4)

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Thibaut, E., Eakins, J., Vos, S., & Scheerder, J. (2016). Time and money expenditure in sports participation: The role of income in consuming the most practiced sports activities in Flanders. *Sport Management Review*.

1. Introduction

To engage in sports participation, both time and money are essential factors (e.g. Becker, 1965; Taks, Renson & Vanreusel, 1994; Wicker, Breuer & Pawlowski, 2010). The recent economic crisis, allied with cuts in government spending, rising unemployment and poverty rates, has brought time and monetary issues to the forefront in putting pressure on sports participation rates. Low-income families in particular are often excluded from sports participation, as they face a harsher financial burden (Bittman, 2002). Families with children may also fall into this group. Therefore, the first aim of this study is to investigate the impact of household income on both the time and money that is spent on sports using a cross-sectional survey about sports participation of Flemish (Flanders is the Dutch-speaking part of Belgium and the research context of this study) families with school-aged children.

For government, the duration of citizens' sports participation is of particular importance, as insufficient physical activity ranks fourth in the list of death causing risk factors. The World Health Organisation (WHO) subscribes a minimum of 60 minutes of physical activity a day for children and 150 minutes a week for adults (WHO, 2010). Governments often lower the price of sports participation through subsidies, such that it also becomes accessible to lower-income households. In Flanders, the government considers the organised sports sector as a key player in increasing sports participation rates and health (Ooms, Veenhof, Schipper-van Veldhoven & de Bakker, 2015). Voluntary sports clubs and sports federations receive subsidies to facilitate club-organised sports participation. In order to improve sports participation figures and physical fitness of the population, sports policy makers and sports clubs require greater insight into the determining factors of the time involvement in sports participation. In contrast with governmental and voluntary sports providers, commercial sports enterprises can be expected to be more interested in (the determinants of) sports expenditure, and less in the time spent on sport. Indeed, their primary focus is making money by selling or renting sports-specific equipment, footwear, clothing and sports infrastructure (e.g. fitness centres) (e.g. Andreff & Andreff, 2009; Gratton, 1998).

Based on the above, it is clear that a more detailed understanding of sports consumption in general, and the relation between income and sports consumption in particular, is needed. First, sports consumption is too often regarded as a composite item, as research has demonstrated that the influencing factors of sports participation and sports expenditure differ depending of the sports activity that is investigated (Humphreys & Ruseski, 2015; Wicker et al., 2010). Consequently, this study compares the effect of income and other determinants of the 13 most practiced sports activities in Flanders. Second, sports consumption consists of both taking part in and spending money on sports participation (Downward, Dawson & Dejonghe, 2009). The current study investigates whether the influence of income differs between time versus money that is spent on sports participation, because it is expected that higher income households have other tastes when compared to lower income households, for example because they have different financial resources. To summarise, the current research aims to provide an understanding of the extent to which income restricts households in consuming sports, by investigating both the amount of money versus time that is spent, and this for the 13 most practiced sports activities in Flanders.

2. Literature overview

2.1. Determinants of different sports activities

Only a limited number of studies have compared different sports activities, while no study is found to do this comparison for the determining factors of the time (e.g. Humphreys & Ruseski, 2015) versus money (e.g. Pawlowski & Breuer, 2011; Wicker et al., 2010) that is spent on sports participation. While these studies did not examine time and money at the same time they demonstrated that sports consumption research benefits from investigating different sports activities rather than treating overall sports participation as a composite item. For example, the inclusion of commonly used socioeconomic and sociodemographic variables can provide further evidence on their effects for a wide range of specific sports activities. Furthermore, other studies that estimated elasticities (e.g. Eakins, 2016; Løyland & Ringstad, 2009; Pawlowski & Breuer, 2012) also used similar explanatory variables and thus a more valid comparison can be made between the studies.

2.2. Money versus time

According to the theory of Becker (1965), economic decisions are restricted by both disposable income and time. People not only have to acquire certain sports goods and services, they also have to spend time on practicing sports. In the literature, Becker's theory has often been applied to the examination of the determinants of the time (e.g. Garcia, Lera-López & Suarez, 2011; Humphreys & Ruseski, 2011; 2015) and money (e.g. Késenne & Butzen, 1987; Løyland & Ringstad, 2009; Thibaut, Vos & Scheerder, 2014; Wicker et al., 2010; Wicker, Prinz & Weimar, 2013) that was spent on sports participation. Although generally a significant positive relationship between time and money expenditure was found (e.g. Scheerder et al., 2011; Wicker et al., 2010), the study of Lera-López and Rapún-Gárate (2005) demonstrated significant differences between the influencing factors of sports expenses and sports frequency. This is important as expenditure data were often used as a proxy for sports consumption, especially when calculating elasticities (e.g. Eakins, 2016; Løyland & Ringstad, 2009; Pawlowski & Breuer, 2012). The literature that investigated the determinants of sports expenditure and sports duration concurrently is very limited. Only one study was found to do this (Lera-López & Rapún-Gárate, 2005)

while to our knowledge no studies calculated the magnitude of the effect of income on both time-involvement data and expenditure data for a range of specific sports activities.

2.3. Determining factors of sports consumption

Table 7.1 gives an overview of the sociodemographic and socioeconomic determinants (gender, age, education, income, family size and urbanisation) that have been investigated in a large selection of sports consumption studies. In general, male sports participants and individuals/households with higher levels of education spent more time and money on sports (e.g. Lera-López & Rapún-Gárate, 2011; Scheerder et al., 2011), while for age and the degree of urbanisation the relationship was less clear (Pawlowski & Breuer, 2011; Wicker et al., 2010). Income had a positive effect on expenditure in all studies, while its influence on time was more ambiguous. Indeed, Humphreys and Ruseski (2011; 2015) found that income had a positive effect on the decision to engage in sports participation, but a negative relationship was found between income and the amount of money that was spent. Although the determinants of time spent on sports participation and sports expenditure tended to have similar signs, Table 7.1 demonstrates that this was not the case for income.

Because the current study uses household data, it is also interesting to have a look at the variables household size and the age of the youngest child. The relationship between household size and sports consumption was negative (e.g. Scheerder et al., 2011; Thibaut et al., 2014). The presence of young children in the family had a negative influence on expenditure (Thibaut et al., 2014) and on time spent on walking, home exercise, golf, weight lifting and running (Humphreys & Ruseski, 2015), while a positive relationship with time spent on swimming was found (Humphreys & Ruseski, 2015).

TABLE 7.1

The determining factors of the decision whether to spend time/money (yes-no) and the amount of time/money that is spent on overall sports participation and on specific sports activities for studies since 2000 (for abbreviations see below the table)

	Time spent on sports participation			**Sports expenditure**		
	Source	**Yes-No (participation)**	**Amount of time (consumption)**	**Source**	**Yes-No (participation)**	**Amount of money (consumption)**
Sex (ref.=women)	Bloom et al., 2005	+	+	Eakins, 2016	/	+
	European Commission, 2014	+	+	Hallmann & Wicker, 2015	/	NS (for Go)
	Garcia et al., 2011	+	+	Lera-López & Rapún-Gárate, 2005	/	+
	Humphreys & Ruseski, 2011	+	+	Lera-López & Rapún-Gárate, 2007	/	+
	Humphreys & Ruseski, 2009	+	+	Løyland & Ringstad, 2009	/	+
	Humphreys & Ruseski, 2015		+ (for C/Go/R/WL)	Scheerder et al., 2011	NS	+
		- (for C/Ex/R/Wa/WL)	- (for Ex/Sw/Wa)			
		NS (for Go)				
				Thibaut et al., 2016	/	+ (for C)
				Wicker et al., 2010	/	+ (for Da, Eq, Go)
						NS (for A/Bd/Bk/C/Di/FH/Gy/H/J/ MS/Sa/Sh/Sk/So/Sw/Te/TT/V)
				Wicker et al., 2013	/	NS (for Tr)
Age	European Commission, 2014	-	-	Eakins, 2016	/	-
	Garcia et al., 2011	+/-	+	Hallmann & Wicker, 2015	/	+ (for Go)
	Humphreys & Ruseski, 2011	-	+	Lera-López & Rapún-Gárate, 2005	/	NS
	Humphreys & Ruseski, 2009	-	-	Lera-López & Rapún-Gárate, 2007	/	-
	Humphreys & Ruseski, 2015	+ (for Ex/C/Sw/Wa/WL)	+ (for Go/Wa)	Løyland & Ringstad, 2009	/	-
		- (for R)	- (for C/Ex/R/Sw/WL)			
		NS (for Go)	NS (for Go)			
				Pawlowski & Breuer, 2011		- (for Sk)
					NS (for D/F/Sk/Sw)	NS (for D/F/Sw)
				Scheerder et al., 2011	-	NS
				Thibaut et al., 2014	NS	NS
				Thibaut et al., 2016	/	+ (for C)
				Wicker et al., 2010	/	+ (for Bd/C/J/Sh/Sw)
						- (for A)
						NS (for Bk/Da/Di/Eq/FH/Go/Gy/ H/MS/Sa/Sk/So/Te/TT/V)
				Wicker et al., 2013	/	+ (for Tr)

Education	European Commission, 2014	+	NS	Hallmann & Wicker, 2015	/	NS (for Go)
	Garcia et al., 2011	+	/	Lera-López & Rapún-Gárate, 2005	/	+
	Humphreys & Ruseski, 2011	+	-	Lera-López & Rapún-Gárate, 2007	/	+
	Humphreys & Ruseski, 2009	NS	+	Pawlowski & Breuer, 2011	+ (for F/Sk) NS (for D/Sw)	NS (for D/F/Sk/Sw)
	Humphreys & Ruseski, 2015	+ (for C/Ex/Go/Sw/Wa/WL) NS (for R)	+ (for C/Ex/Go/R/Sw/Wa/WL)	Scheerder et al., 2011	+	+
				Taks et al., 1995	/	NS
				Thibaut et al., 2014	+	NS
				Thibaut et al., 2016	/	+ (for C)
				Wicker et al., 2010	/	- (for A/FH/Sw) NS (for Bk/Bd/Bk/C/Da/Di/Eq/ Go/Gy/H/J/MS/Sa/Sh/Sk/So/Te/TT/V)
				Wicker et al., 2013	/	NS (for Tr)
Income	Garcia et al., 2011	+	-	Bloom et al., 2005	/	+
	Humphreys & Ruseski, 2011	+	-	Hallmann & Wicker, 2015	/	+ (for Go)
	Humphreys & Ruseski, 2009	+	+	Eakins, 2016	/	+
	Humphreys & Ruseski, 2015	+ (for Go/R/Sw//WL) NS (for C/Ex/Wa)	- (for Ex/Go/R/Wa/WL) NS (for C/Sw)	Késenne & Butzen, 1987	/	+ (for So/Sw/Te/V)
				Lera-López & Rapún-Gárate, 2005	/	+
				Lera-López & Rapún-Gárate, 2007	/	+
				Løyland & Ringstad, 2009	/	+
				Taks et al., 1995	/	+
				Thibaut et al., 2014	+	+
				Wicker et al., 2010	/	+ (for A/Bk/C/Da/Di/Eq/FH/Go/Gy/ H/MS/Sa/Sh/Sk/Te/V) NS (for Bd/J/So/Sw/TT)
				Wicker et al., 2013	/	+ (for Tr)
Family size/ Number of children	Garcia et al., 2011	-	+	Bloom et al., 2005	/	+/-
	Humphreys & Ruseski, 2011	-	/	Lera-López & Rapún-Gárate, 2005	/	NS
	Humphreys & Ruseski, 2009	NS	-	Pawlowski & Breuer, 2011	+ (for Sw) NS (for D/F/Sk)	NS (for D/F/Sk/Sw)
				Scheerder et al., 2011	-	-
				Thibaut et al., 2014	NS	-
Urbani-zation	Garcia et al., 2011	+	/	Eakins, 2016	/	-
				Lera-López & Rapún-Gárate, 2005	/	NS
				Lera-López & Rapún-Gárate, 2007	/	NS
				Pawlowski & Breuer, 2011	+ (for D/F) NS (for Sk/Sw)	+ (for Sw) NS (for D/Sk)
				Thibaut et al., 2014	NS	NS

Note. '+' = positive significant effect; '-' = negative significant effect; 'NS' = non-significant; '/' = participation/consumption decision was not investigated
A=athletics; Bd=Badminton; Bk=basketball; C=cycling; Da=dancing; Di=diving; Eq=equestrian; Ex=exercise; FH= Field Hockey; Go=golf; Gy= gymnastics; H=handball; J=Judo; MS=Mountain Sports; R=running; Sa=Sailing; Sh=shooting; Sk=ski; So=soccer; Sw=swimming; Te=tennis; Tr=triathlon; TT=table tennis; V=volleyball; Wa=walking; WL=weight lifting

2.4. Income elasticities

A limited number of studies explored the effect of income on sports expenditure by calculating income elasticities. In Norway, Løyland and Ringstad (2009) estimated an income elasticity for sports purchases equal to +1.25, while in Ireland Eakins (2016) found elasticities greater than 1 for sports participation, sports club subscriptions and fees to leisure classes. In contrast, for Flanders, the estimated income elasticities of all investigated sports activities were less than 1 (Késenne & Butzen, 1987). Finally, Pawlowski and Breuer (2012) found contrasting estimates based on the method used, with sports a luxury good based on the standard Tobit method and a necessity good based on the Heckman approach.

The results that are listed above demonstrate that differences were found between the resulting elasticity values and the classification of sports participation as a necessity good ($\varepsilon<1$) or a luxury good ($\varepsilon>1$) in Ireland (Eakins, 2016), Norway (Løyland & Ringstad, 2009) and Flanders (Késenne & Butzen, 1987). It is expected that these differences not only depend on the research context, but also on the sports activities and how sports participation is defined. All the studies have in common that a positive relationship was found between income and money spent on sports.

In addition to previous research, the effect of a relative change in income is not only calculated based on expenditure data but also on time data, because both theory and empirical results indicated that income is related differently to time expenditure on the one hand and money expenditure on the other hand. For example, it can be argued that with rising income the opportunity cost of time rises, such that these individuals will be expected to spend more money, and/or relatively less time, on sports participation. For example, the empirical results of Meltzer and Jena (2010) demonstrated that economic agents with a higher level of income were found to practice sports more time-efficiently by increasing the intensity. Also, a number of studies found a negative relationship between income and time spent on sports participation (e.g. Downward, 2007; Humphreys & Ruseski, 2011), while Taks et al. (1994) demonstrated that the amounts of money and time that was spent on sports, differed depending on the sports activity that was practiced.

Thus the current study adds to the existing literature by calculating the magnitude of the effect of income on sports expenditure and the time that is spent on sports participation. A further addition to the literature is the fact that both the income-expenditure-elasticities and the income-time-elasticities are calculated for a range of sports activities.

3. Data

The data originate from a cross-sectional survey about sports participation in Flemish families with school-aged children. Since 1969, a standardised questionnaire has been handed out to a representative sample (for region, educational system, school type, urbanisation) of primary and secondary Flemish schools every ten years. The data of the current study stem from the 2009 survey, applied in 26 primary and 13 secondary schools. Questionnaires were handed out to a representative (for age, sex) sample of 4,497 students. Each child was asked to hand over the questionnaire to their parents, who on their turn filled out the survey for each member of their family (mother, father, first child, second child, etc.).

The survey contained questions about the sports participation habits of each family member during the past year. Each household had to write down the sports activities that each family member had practiced

during the previous 12 months, but also – per sports activity – the amount of time and money they had spent on these sports during that specific period. The extensive reference period of one year makes sure that the zeros in the dataset should not be attributed to infrequency of purchase. In total, 67 percent of the questionnaires were returned, resulting in a sample of 3,005 questionnaires. Table 7.2 gives an overview of the household characteristics that have been used as the independent variables.

TABLE 7.2
Descriptive results of the independent variables

Variable	Mean	Std. Dev.	Min.	Max.
Income (€/month)	2904.767	23.328	1000	5000
Urbanisation:				
Rural (ref.)	0.250	0.433	0	1
Municipality	0.233	0.423	0	1
City	0.517	0.500	0	1
Age of the head of household:				
<36y (ref.)	0.035	0.003	0	1
36-40y	0.155	0.007	0	1
41-45y	0.337	0.009	0	1
46-50y	0.313	0.009	0	1
>50y	0.160	0.007	0	1
Education of the head of household:				
Low (ref.)	0.208	0.008	0	1
Middle	0.332	0.009	0	1
High	0.460	0.010	0	1
Number of Family members	4.246	1.118	1	11
Age of the youngest child:				
<6y (ref.)	0.141	0.006	0	1
6-12y	0.551	0.009	0	1
13-18y	0.308	0.008	0	1

After the questionnaires were collected, the sports activities were categorised based on an extensive list of 191 sports activities, ranging from popular sports activities (e.g. swimming, cycling, etc.) to less-practiced sports activities (e.g. racketlon, runbike, aquaspinning, etc.). An extensive amount of 20 expenditure categories was used to help the respondents in recalling their expenditure as accurate as possible, which are sports club membership, licence, registration fee, subscription for tournaments/events, admission fee sports infrastructure, lessons, sports camps and holidays, clothing, equipment, footwear, transportation by car, public transport, sports associated social costs (e.g. club dinners), sports food and drinks, medical care, extra insurance, extra childcare, other costs. Expenditure on spectator sports and on commuting[5] were omitted because the focus of the questionnaire was on active voluntary sports participation. Questions to calculate the annual number of hours per sport were also included in the survey[6]. Time and expenditure data were corrected for outliers by cutting off the 0.5 percent highest values.

5 In this study walking and cycling are voluntary, sportive leisure activities, and not physical activity parameters. Cycling and walking to work, to the grocery store, or taking stairs are thus not incorporated, although from a biomedical point of view these activities contribute to physical activity.
6 Annual number of hours = number of times a week * number of minutes per time/60 * 52

In Table 7.3 the descriptive statistics per sport are given for the 13 most practiced sports, which are defined as the sports activities on which more than 100 households spend money and time. The most expensive sports are winter sports and horse riding, while the most time-intensive sports for families are basketball and soccer.

In line with previous research (e.g. Scheerder et al., 2011; Wicker et al., 2010), the variables sports expenditure and time spent on sports are positively correlated. Yet, as the significant correlation values for total sports participation (0.28) and for numerous sports activities are not very high, it is possible that differences exist between how much time and money that people spend on (specific) sports. The time-expenditure-ratio gives an indication of the number of hours that households practice a sports activity for every euro spent (Table 7.3). Some sports that are expensive in absolute terms turn out to be relatively cheaper when the cost per hour of sports participation is calculated. While winter sports and horse riding still top the list (low time-expenditure ratio), sports like martial arts and soccer are relatively cheaper (high time-expenditure ratio) because they are practiced longer.

TABLE 7.3
The 13 most practiced sports activities: expenditure, time involvement and income of the participants

	Expenditure per year (€)	SD	N	Hours per year	SD	N	Time-expenditure-ratio (Hours of sports per euro)	Income per month (€)	Correlation Time-Expenditure
Total	1,580.5	34.5	2,401	2,060.2	80.7	1999	1.3	3,099.5	0.284***
Soccer	642.4	21.6	788	1,856.9	113.8	552	2.9	3,006.0	0.455***
Swimming	364.7	19.0	609	453.3	48.4	571	1.2	3,011.8	0.292***
Dance	374.1	15.6	592	375.3	43.7	474	1.0	3,051.1	0.283***
Cycling	657.3	33.9	554	449.8	57.0	574	0.7	3,071.1	0.224***
Running	441.1	22.1	532	489.4	41.8	563	1.1	3,119.7	0.248***
Gym/fitness	478.7	26.5	354	447.9	66.3	328	0.9	2,920.8	0.215***
Tennis	783.3	42.4	344	260.5	53.4	284	0.3	3,087.5	0.356***
Horse riding	1,145.4	89.0	229	107.3	23.6	171	0.1	2,778.9	0.341***
Martial arts	374.8	28.3	193	1,155.8	150.1	156	3.1	2,759.1	0.517***
Winter sports	1,288.5	95.4	189	63.4	14.1	142	0.0	2,853.9	0.172***
Volleyball	539.7	41.3	181	1,133.8	149.0	150	2.1	2,835.7	0.383***
Walking	520.0	45.6	154	199.8	27.9	189	0.4	2,747.5	0.227***
Basketball	563.1	46.9	146	2,464.5	297.8	114	4.4	2,720.1	0.607***

4. Econometric methodology

The variables sports expenditure and time involvement in sports contain excess zeros. The standard Tobit model (Tobin, 1958) is a popular method to deal with censored dependent variables in the field of sports consumption (e.g. Dardis, Soberon-Ferrer & Patro, 1994; Dawson & Downward, 2013; Downward & Rasciute, 2010; Eakins, 2016; Pawlowski & Breuer, 2012). Essentially the Tobit model uses a latent variable representation of the dependent variable where the known observable values are given by the actual non-zero expenditures or times and the unknown unobservable values are denoted as zero. The Tobit model can therefore represent corner solutions, that is, households with zero levels

of expenditure or time would like to consume the good but cannot due to current prices and income (Aristei & Pieroni, 2008; Humphreys, Lee & Soebbing, 2010; Verbeek, 2012).

A disadvantage of the standard Tobit model is that its assumptions are restrictive. First, it seems unlikely that all zeros should be attributed to corner solutions. Zeros may come from the individual's deliberate choice to abstain from consuming the good, for example. Second, the determinants of the participation (yes-no) and the consumption (amount of time/money) decision are forced to be the same in the Tobit model (Ground, 2008; Humphreys & Ruseski, 2015). Therefore, adapted versions of the standard Tobit model have been developed (Amemiya, 1984). Generally, they can be subdivided in two broad categories, namely two step Heckman models (used by e.g. Downward & Riordan, 2007; Pawlowski & Breuer, 2011; Thibaut et al., 2014), and hurdle models (used by e.g. Humphreys & Ruseski, 2011; 2015).

According to Jones (2000) the Heckman approach defines the zeros in the dependent variable as non-genuine, that stem from non-observable response (Humphreys, 2013; Jones, 2000). Because of the focus on (expenditure and time involvement in) specific sports activities, a large proportion of 'genuine zeros' are present, as even the most popular sports activities are practiced by a relatively small proportion of respondents. The relative long reference period (one year) of the survey, combined with the large number of expenditure categories, indicates that the majority of the zeros do not stem from goods and or services that are purchased infrequently. Therefore, the Heckman approach is not suited for the data.

The second alternative for the Tobit model is a hurdle model. Several hurdle models have been suggested in the literature including the double hurdle model developed by Cragg (1971) where the participation and consumption models are estimated jointly, and the log normal/truncated normal hurdle models outlined by Wooldridge (2010) where the participation and consumption models are estimated separately. The advantage of a hurdle model is that the participation and consumption determinants are allowed to differ from each other (Ground, 2008). Hurdle models are difficult to estimate however as exclusion restrictions are required, that is, a different set of variables in the participation and consumption models. The normal procedure is to exclude variables from the consumption (amount) decision but there are no *a priori* guidelines for deciding on what variables should be excluded. This study also encountered these issues and estimations using hurdle models did not converge. Given that the Heckman is unsuitable for the data, an analysis using a Tobit model is carried out.

In the context of this study, the Tobit model does to an extent provide a satisfactory modelling framework because the focus is on continuous variables (i.e. income, time, expenditure) and not on the participation decision. In addition to this, many previous studies (e.g. Breuer & Pawlowski, 2012; Dardis et al., 1994; Dawson & Downward, 2013; Downward & Rasciute, 2010; Eakins, 2016) have demonstrated the robustness of the standard Tobit model in the field of sports participation and sports expenditure.

The Tobit model is estimated using Maximum Likelihood (ML) techniques and thus while the sign of the estimates can be interpreted in the same fashion as OLS estimates, the magnitude cannot. In order to assess the impact of income on the dependent variable, it is necessary to calculate marginal effects. In the Tobit model, the formula for the marginal effect is given by:

$$\frac{\partial E[y_i|x]}{\partial x_j} = \beta_j \Phi\left(\frac{x_i\beta}{\sigma_i}\right) \qquad (1)$$

where $E[y_i \mid x]$ is the unconditional expectation (or unconditional mean) of y_i. It is called the unconditional expectation because it is based on all values or y_i rather than a subset of positive values. The marginal effects can be used to calculate elasticities[7] for the unconditional level of expenditure (y_{exp}) and unconditional level of time (y_{time}) i.e. each dependent variable, using the following formula:

$$e_{Inc-exp} = \frac{\partial E[y_{exp}|x]}{\partial Income} * \frac{Income}{E[y_{exp}|x]} \quad (2a)$$

$$e_{Inc-time} = \frac{\partial E[y_{time}|x]}{\partial Income} * \frac{Income}{E[y_{time}|x]} \quad (2b)$$

It should be noted that these estimated elasticities are not true income elasticities in the sense that they do not estimate the effect of income on quantity demanded. Effectively these elasticities estimate the effect of income on a measure of sports consumption. Comparison between the money-income effects and time-income effects is also limited because they are two different measures of sports consumption. Nonetheless the estimates will provide interesting insights into the effect that income has on sports expenditures and sport duration. To avoid confusion with true income elasticities, the current study opts for the terms 'income-expenditure-elasticity' and 'income-time-elasticity', which measure the effect of a percentage change in income on a percentage change in the amount of money/time that is spent on sports participation.

5. Results and discussion

Table 7.4 gives an overview of the Tobit regression results for the two dependent variables, time/money that is spent on sports participation. Looking first at overall sports participation, the results demonstrate that income has a positive effect on both time and money. This positive relationship is in line with previous research for income (e.g. Eakins, 2016; Lera-López & Rapún-Gárate, 2005; 2007; 2011; Løyland & Ringstad, 2009; Thibaut et al., 2014) and for time (Lera-López & Rapún-Gárate, 2005), and indicates that the overall income-expenditure-elasticity and income-time-elasticity will be positive (see also Table 7.5). This positive effect of income on sports consumption is relevant for policy purposes, as due to the economic crisis there is a rising number of low-income families. Based on the regression results it can therefore be concluded that people who live in poverty have a lower chance of spending time and money on sports, as they face a financial burden (Bittman, 2002).

[7] The elasticities were calculated using the margins-command in Stata

TABLE 7.4

Coefficients of the Tobit regression of socioeconomic determinants on time (in hours) and money (in €) that is spent on sports participation in general and on 13 specific sports activities

	Total		**Soccer**		**Swimming**		**Dance**	
	Exp	*Time*	*Exp*	*Time*	*Exp*	*Time*	*Exp*	*Time*
Income	0.5***	0.5***	0.1***	0.7***	0.1***	0.1	0.1***	0.2***
Urbanisation								
Rural (ref.)								
Municipality	-207.3	-498.4	-98.7	-550.4	20.4	17.2	-115.4	-47.5
City	-254.3*	-398.9	-170.0*	-731.3*	68.9	92.7	-98.8	-150.2
Age HOH								
<36y (ref.)								
36-40y	137.0	160.9	-60.5	182.6	-173.6	-138.1	-121.6	127.8
41-45y	398.8	418.6	95.9	477.7	-283.0*	-335.3	-43.3	93.5
46-50y	614.8*	522.4	-67.0	-273.2	-267.0*	-355.7	-63.4	122.1
>50y	225.2	-46.4	-211.8	-433.5	-284.7*	-422.3	27.2	219.1
Education HOH								
Low (ref.)								
Middle	385.8**	658.3*	-159.6	-536.4	156.0*	510.8***	156.4	220.3
High	529.2***	1268.3***	-272.5**	-597.9	294.2***	783.44***	290.9***	451.5***
Number of family members	-1.0	418.2***	137.7***	527.6***	-25.5	-5.8	-22.7	17.9
Age youngest child								
<6y (ref.)								
6-12y	226.2	1256.2***	217.4*	1564.7***	-120.4	-282.4*	95.1	205.1
13-18y	362.7*	1929.6***	346.8**	2677.5***	-268.2**	-482.7**	4.6	67.0
Constant	-1039.0**	-4895.0***	-1485.2***	-8373.9***	-614.5***	-1267.7***	-944.8***	-2253.6***

	Cycling		***Running***		***Gym/fitness***		***Tennis***	
	Exp	*Time*	*Exp*	*Time*	*Exp*	*Time*	*Exp*	*Time*
Income	0.2***	0.1*	0.2***	0.2***	0.1	0.1*	0.3***	0.3***
Urbanisation								
Rural (ref.)								
Municipality	-79.0	64.5	12.5	143.7	146.3	184.8	-148.3	-195.5
City	-150.1	-88.2	-89.5	-25.7	46.4	85.8	7.2	42.1
Age HOH								
<36y (ref.)								
36-40y	-63.1	-385.5	175.1	-72.9	254.5	373.3	913.7	653.9
41-45y	-100.6	-173.7	210.5	69.1	217.0	347.2	1234.7	863.7
46-50y	125.2	-60.4	223.6	133.3	371.0	554.1	1402.0*	993.3
>50y	-331.0	-377.9	81.5	199.0	252.2	381.5	1142.0	700.9
Education HOH								
Low (ref.)								
Middle	138.1	370.8*	-159.2	-191.7	136.3	308.1	266.0	-51.4
High	105.1	458.3*	145.9	177.9	142.1	242.4	638.3***	415.6*
Number of family members	-18.2	21.2	19.5	104.9*	50.1	90.4	-48.8	-10.0
Age youngest child								
<6y (ref.)								
6-12y	-5.3	159.3	77.4	302.0*	-62.8	120.3	117.6	220.7
13-18y	521.2**	667.6**	178.9	534.2**	257.3	603.5**	-302.8	52.9

Note. HOH=head of household

*$p < .05$. **$p < .01$. ***$p < .001$.

	Horse riding		Martial arts		Winter sports	
	Exp	*Time*	*Exp*	*Time*	*Exp*	*Time*
Income	0.2	0.1	0.1	0.4*	0.7***	0.1**
Urbanisation						
Rural (ref.)						
Municipality	28.6	-46.3	68.5	199.1	-592.1	-31.1
City	-44.9	-6.9	-37.6	-429.6	-255.8	2.9
Age HOH						
<36y (ref.)						
36-40y	499.7	159.9	450.9	4.6	1486.0	107.3
41-45y	342.1	181.4	366.5	130.9	1222.2	68.2
46-50y	499.1	191.5	310.6	93.4	1674.7	85.3
>50y	490.3	164.5	244.2	-439.7	1277.0	57.8
Education HOH						
Low (ref.)						
Middle	627.1	140.1**	200.0	557.4	159.8	12.5
High	684.0	173.3*	149.1	516.1	658.5	37.9
Number of family members	229.7*	35.1	18.1	-50.1	-118.6	-0.1
Age youngest child						
<6y (ref.)						
6-12y	367.3	60.5	-128.5	-297.8	1377.0*	154.5**
13-18y	341.0	70.1	-183.8	-613.9	1482.0*	170.4**
Constant	-6492.7***	-1220.4***	-1983.0***	-6,182.4***	-8749.5***	-702.7***

	Volleyball		Walking		Basketball	
	Exp	*Time*	*Exp*	*Time*	*Exp*	*Time*
Income	0.2**	0.3*	0.1	0.1	0.1	0.8*
Urbanisation						
Rural (ref.)						
Municipality	-109.8	7.9	-87.2	-97.1	-135.5	-1,068.6
City	-46.5	-381.0	-24.4	-3.4	-77.6	-45420.4
Age HOH						
<36y (ref.)						
36-40y	527.3	863.3	-273.8	64.5	-247.3	1,924.9
41-45y	490.9	666.1	-27.4	197.1	117.4	2,655.1
46-50y	860.2	1419.7	-47.3	147.5	84.9	2,925.3
>50y	363.1	148.4	-35.7	218.4	454.0	3,783.5
Education HOH						
Low (ref.)						
Middle	450.2*	1213.2*	-46.6	-125.2	284.3	-18.8
High	315.8	1050.5	208.2	60.4	461.6*	1,297.5
Number of family members	86.3	303.1	-6.1	60.5*	-76.3	-114.8
Age youngest child						
<6y (ref.)						
6-12y	420.7*	908.4	-22.8	188.5	-194.0	-403.6
13-18y	276.8	875.0	303.6	347.5**	-259.8	-469.8
Constant	-3919.3***	-9704.6***	-2033.6***	-1538.9***	-2325.9***	-15760.4***

Note. HOH=head of household
*$p < .05$. **$p < .01$. ***$p < .001$.

Nevertheless, this significant positive effect of income is not consistently found for all sports activities, and not always for both time and money expenditure. First, income has no significant effect on the time that is spent on swimming and on the money expenditure on fitness, martial arts and basketball. For horse riding and walking, income is insignificant in both the time and expenditure models. These findings suggest that income, whilst being a barrier to overall sports participation, is not a barrier to spending money or time in some sports activities. This has implications for policy design when targeting lower income households, as government can decide which sports activities are relatively income-independent, and, for which sports activities financial stimulus is needed to include households who are low on income.

Based on the results in Table 7.4, the following conclusions can be drawn. Income is found to positively influence both the money and the time that is spent on sports participation. This is important as income is a factor that varies significantly between households and citizens. Moreover, income is a factor that government has an impact on, as subsidizing sports is an important policy tool. Nevertheless, the results clearly indicate that not for all sports activities significant differences are found. This stresses the importance for sports managers not (only) to focus on sports consumption as a composite item, but also bear in mind that sports consumption is influenced differently depending on the specific sports activity.

The effect of household income also differs across money and time. Households with higher income, for example, spend more money (but not time) on swimming, while it is the other way around for gym/fitness, martial arts and basketball. One can also consider these differences in the determining factors of time versus money expenditure, when calculating the elasticity of income with respect to time and money that is spent on sports participation. Table 7.5 presents the estimated income-time-elasticities and income-expenditure-elasticities for overall sports participation/expenditure and for the 13 specific sports activities.

TABLE 7.5
Income elasticities for the sports activities based on expenditure and time data

Sports activity	Based on expenditure	Based on time
Overall	0.69***	0.46***
Soccer	0.60***	0.86***
Swimming	0.67***	0.03
Dance	0.84***	0.84***
Cycling	0.75***	0.43*
Running	1.28***	0.92***
Fitness	0.43	0.58*
Tennis	1.34***	1.42***
Horse riding	0.44	0.43
Winter sports	1.49***	1.12**
Martial arts	0.53	0.83*
Volleyball	1.01**	0.76*
Walking	0.35	0.43
Basketball	0.56	0.93*

*$p < .05$. **$p < .01$. ***$p < .001$.

The findings in Table 7.5 indicate that all investigated sports activities have a positive value for both the income-expenditure-elasticities and the income-time-elasticities. For the expenditure data, this positive income-expenditure effect is in line with the studies of Eakins (2016), Løyland and Ringstad (2009) and

Pawlowski and Breuer (2012). The positive relationship between income and time spent on sports participation however contrasts with some previous research (e.g. Downward & Riordan, 2007; Garcia et al., 2011; Humphreys & Ruseski, 2015), although it is in line with the research by Humphreys and Ruseski (2009) and Lera-López and Rapún-Gárate (2007).

The fact that running has a high income-time-elasticity and income-expenditure-elasticity, is perhaps surprising, as running is a relatively cheap sports activity (high time-expenditure-ratio). Two possible explanations can be put forward. First, based on Becker's theory Meltzer and Jena (2010) argue that time-efficient activities are attractive for people for whom their leisure time has a high opportunity cost, i.e. those with higher incomes[8]. Runners can much more easily practice their sports activity starting from home/work, when compared to activities that involve some form of preparation or involve going to a sports facility (Hallmann, Breuer & Dallmeyer, 2015). Running is also a solo-activity that is not dependent on friends or an opponent, and the MET-value (i.e. physiological measure of the energy cost of physical activities per time unit) of running is relatively high compared to other activities, thereby making it a time-efficient physical activity (e.g. Meltzer & Jena, 2010). A second reason why the income-time-elasticities and the income-expenditure elasticities are relatively high, is that according to heterodox economic theory (e.g. Downward, 2007; Scheerder et al., 2011; Thibaut, Vos, Lagae, Van Puyenbroeck & Scheerder, 2016) higher income households prefer sports activities that are in agreement with their beliefs/values (e.g. physically challenging, improving personal bests, etc.).

Other sports activities such as walking, fitness and horse riding are independent of income. For walking this could be due to the low time-efficiency (low MET-value). For horse riding a possible explanation could be that a lot of children practice horse riding in the setting of the (subsidised) sports camps. As these subsidies make it possible to practice horse riding below the market price, the income-consumption effect is possibly eliminated. The findings for fitness seem to be counterintuitive as this sport is almost exclusively practiced in commercial fitness centres, which unlike sports clubs, are not subsidised. Nevertheless, previous research has demonstrated that people who face a difficult financial situation take part in commercial settings (e.g. fitness) more often than in sports clubs (Borgers, Pilgaard, Vanreusel & Scheerder, 2016), thereby indicating that fitness could be independent of income. A possible explanation is that average expenditure on fitness is relatively low, thereby indicating that practising fitness is not that expensive (see also Table 7.2). Also, this sports activity possibly fits well with the tastes of lower income-households, for example because of the fact that the cost of fitness is relatively clear, as more than 60 percent of total expenditure is spent on membership fees. The latter contrasts with the finding that membership fees only accounts for a marginal part of total expenditure on the other sports activities (Scheerder, Thibaut & Willem, 2015).

Finally, Table 7.4 also shows that significant results were found for some of the other variables than income. Despite the overall positive effect of education (e.g. Humphreys & Ruseski, 2015; Scheerder et al., 2011), no effect is found for education on cycling expenditure, on soccer time, and on both time and money spent on running, fitness, horse riding, martial arts, winter sports and walking. Education has

8 As argued by the PhD commission, the household production theory focusses on wage rate instead of income. Because information about the wage rate is often not included, studies instead often use income (e.g. Downward & Rasciute, 2010; Hallmann & Breuer, 2014; Wicker, Breuer & Pawlowski, 2010), thereby assuming that – on average – the wage rate varies proportionally across different income levels.

been linked to the concept of human capital and one's awareness of the positive effects of physical activity (Wicker et al, 2010) and so a positive relationship between it and overall sports participation is expected.

Families living in cities spend less money on overall sports participation (e.g. Eakins, 2016), although no effect on time was found. Families with a middle-aged head of household have higher overall sports spending while there is no relationship with the time that is spent on any of the sports activities. The bigger the family, the more time a household spends on sports (e.g. Garcia et al., 2011). This is not surprisingly, as the amount of time engagement in sporting activities can be assumed to rise proportionally with the number of children, while household income remains constant. Finally, families with older children spend more time and money on sports. The same conclusion goes for soccer, cycling and winter sports. This is not surprising in that outlays of money and time would be expected to increase as a child get older e.g. more equipment required, longer training sessions. For swimming a negative significant relationship is found, as families with younger children are likely to be more intensive consumers of this activity.

6. Conclusions and implications

The objective of this study is to analyse the determinants of both time and money spent on sports participation in Flanders, with a specific focus on the effect that income has on time and money spent on 13 specific sports activities. Previous research has analysed both aspects of sports consumption but not concurrently. In addition, much of the previous literature has treated sports participation and sports expenditure as a composite item, while in contrast this study provides a more comprehensive investigation by analysing and comparing 13 of the most practiced sports in Flanders as well as overall sports participation. It is concluded that income has a significant and substantial effect on the money and time that is spent on sports participation, but that this effect is not the same for all sports activities.

A number of policy implications can be formulated. First, policy makers should consider how to facilitate and augment sports participation rates. Low-income families are often excluded from consuming sports participation, which is important given the consistent pressure on public spending on sports. Current Flemish sports policy tries to stimulate sports participation by subsidizing grass roots sports clubs and sports camps, and by building and maintaining sports infrastructure (e.g. swimming pools, sports halls) in order to make these sports financially more accessible. In addition, government could also consider stimulating participation in other sports contexts such as sports events, fitness and health centres, or sports activities that mainly take place outside the boundaries of a sports club, such as walking, running and cycling. This could turn out to be an effective policy tool, especially because quantitative research has demonstrated that people with financial difficulties participate more in commercial settings and informally organised sports (Borgers, Pilgaard, Vanreusel & Scheerder, 2016), and because the commercial sports sector (e.g. fitness centres) is found to offer opportunities for socially deprived groups (Theeboom, Haudenhuyse & De Knop, 2010). Also, maybe counter intuitively, sports participation in a commercial setting is not necessarily more expensive than in a subsidised sports club. Fitness is for example relatively cheap per time unit when compared to other popular activities (see also Table 7.5), and the subscription options are often more flexible than is the case for sports clubs.

Second, the Flemish government subsidises only the supply side (i.e. sports clubs, infrastructure), implying that almost no price differentiation is made on the demand side. Funding which goes directly towards lower income groupings could be considered, for example by means of sports-vouchers (in line with meal-vouchers). The consumer will then have the possibility to decide on which sports activity/provider he or she is going to spend their money. Also, government will have a cost-efficient tool as it will only have to subsidise the low-income groups, and not the high-income individuals who are prepared to pay the market price (capturing the consumer surplus). Based on the values of the income-time/expenditure-elasticities and the policy objectives, government can decide how policy actions will be most efficient and effective.

Finally, the results indicate that studies on aggregated forms of sports consumption have their value, but that future research should also focus on specific sports activities. Households and individuals not only choose whether they participate in sports or not, but also between a wide variety of sports activities.

A few limitations and suggestions for further research can be formulated. First, the sample focuses on families with school-aged children, as they are a significant and important part of the society, and because a lot of policy actions aim to persuade young children into lifetime sports participation. The consequence is that the sample is not representative for all Flemish households. For example, it is possible that the time and money that is spent on sports participation is higher for young, childless households, while the time involvement of retired households in certain time-intensive sports activities may be higher. Second, as this study opted for a reference period of one year to eliminate seasonal effects and zeros because of infrequency of purchase, it may be hard for respondents to recall the time and money they had spent on sports participation during the previous year. This study tried to reduce the recall bias by splitting total expenditure and total time spent on sports participation into a number of – more concrete – questions. Finally, whilst the focus of this study was on an analysis of time and money separately it would be interesting to investigate the relationship between the two variables in more detail. One possible option would be to include the variables as explanatory variable in each model although issues regarding the direction of causality and other modelling aspects would also have to be dealt with in an appropriate manner. Future research could explore this avenue of investigation.

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CHAPTER 8
Partaking in Cycling, at what Cost? Determinants of Cycling Expenses (Paper 5)

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1. Abstract

This study analyses the determinants of cycling expenditure by means of a Tobit regression analysis, based on a dataset of 5,157 cyclists. Using a heterodox economic approach, 23 different variables are combined into two commonly used variable groups in the field of sports expenditure (sociodemographics, sports intensity variables) and two variable groups (socioeconomic cycling capital, and attitudes, interests, opinions (AIOs)) that are less frequently incorporated. With all variables included in the Tobit regression, sex, trip duration, frequency, number of cycling variants practiced, visiting cycling websites, and practicing road bicycle racing or mountain bike influence cycling expenditure positively. A negative association is found with competitive riding and cycling drop out. It is suggested that marketers of cycling services and cycling apparel should meet the cyclist's need for identification instead of focusing solely on sociodemographic factors.

2. Introduction

Today, cycling for leisure, recreation and tourism is a very popular activity. Bicycle sales across Europe, the United States and New Zeeland have reached record levels (Gluskin Townley Group, 2014; Lamont, 2009). Worldwide, an average of more than 100 million bikes a year were produced during the last decade (Gardner, 2009), twenty million of which were sold in Europe only (Colibi and Coliped, 2012). In the Netherlands the average sale price per bicycle is €746, which is by far the highest of the EU member states, followed by Germany (€495), Denmark (€420), Austria (€420), and Belgium (€410) (Colibi and Coliped, 2012). Together with bicycles, a high variety of related cycling products and services are commercialized. Although it is commonly known that people spend relatively large amounts of money on cycling, little research has focussed on the determining factors of cycling expenditure.

The sharp rise in sports participation rates during the last decades in Europe (Scheerder, Vandermeerschen, Van Tuyckom, Hoekman, Breedveld and Vos, 2011b), the United States (Schoenborn and Barnes, 2002) and Australia (Standing Committee on Recreation and Sport, 2010) is one of the evident causes of the increasing importance of sports consumption in total economic outlays, as indicated by Davies (2002) and Lera-López and Rapún-Gárate (2007). Yet after the spectacular increase in sports participation since 1970, its growth seems to have flattened out, with even a slight

downturn in some European countries (Lera-López and Rapún-Gárate, 2011; Scheerder et al., 2011b). Therefore, it is interesting to look for new growth opportunities, of which cycling is a prime example. In 10 of the 12 European countries that were investigated in the study of Scheerder, Lagae and Boen (2011a), cycling is listed in the top five of most popular sports. In Flanders, the Dutch speaking part of Belgium that constitutes the research context of this study, cycling is the second most popular sport (Scheerder et al., 2011b). Moreover, cycling is a prime example of a sports activity that is not necessarily practiced in formal settings (such as voluntary sports clubs) and that takes place independently of specific times and places (Breuer, Hallmann and Wicker, 2011). While the popularity of traditional sports has stagnated, participants now favour these new kinds of sports activities, such as sports participation in informal groups, commercial arrangements, mass sports events, or just individual sports participation (Lera-López and Rapún-Gárate, 2005; Scheerder et al., 2011a). In fact, nowadays the majority of the grass roots sports participation in Europe takes place outside the boundaries of sports clubs (European Commission, 2010).

There are three reasons why this study focusses on the determinants of cycling expenditure. First, most studies focus on expenditure on sports participation in general (e.g. Lera-López and Rapún-Gárate, 2005; Thibaut, Vos and Scheerder, 2014), while both practice and research (e.g. Hallmann and Wicker, 2015; Wicker, Breuer and Pawlowski, 2010) demonstrate that significant differences exist between different kinds of sports. Second, the present study does not only investigate the influence of sociodemographic and socioeconomic variables on sports expenditure, fitting within the framework of orthodox (neoclassical) economics. Indeed, we build on a so-called heterodox theoretical perspective – as explained below – to look at additional explanatory variables. Third, the large number of cycling participants provides a favourable market for both the private sector and public authorities. With respect to the former, research demonstrates that taking part in cycling goes hand in hand with relatively large cycling expenses compared to other sports, because capital goods like a bike and other sports equipment and apparel are needed (Humphreys and Ruseski, 2009). For public authorities, the promotion of cycling is interesting because it offers financial savings to both the individual and the community, as cycling generates more economic benefits (e.g. health, tourism, cycling apparel industry) than costs (Oja, Titze, Bauman, de Geus, Krenn, Reger-Nash and Kohlberger, 2011).

3. Literature review and hypotheses

3.1. Theoretical background

Different theoretical perspectives have been used to explain the determinants of sports participation and sports expenditure (for an overview see Downward and Rasciute, 2010). The economic theories can be divided into two broad categories. On the one hand, the *neoclassical, orthodox approach* draws upon theoretical foundations such as rationality, maximizing behaviour given certain constraints (e.g. time and/or money), market equilibrium and stable preferences (Downward and Riordan, 2007). According to Becker's (1965; 1976) household production theory, economic agents are both consumers and producers, such that the distinction between leisure and work disappears. Indeed, consumers combine market goods and time to produce commodities that improve their utility. The cost of time is explicitly incorporated into the consumption decision: the more someone earns per unit of time, the higher the cost of leisure (Becker, 1965; Downward, 2007). The orthodox approach has been applied in explaining sports participation (e.g.; Downward, 2007; Downward and Riordan, 2007; Wicker, Breuer and

Pawlowski, 2009) and sports expenditure (e.g. Lera-López and Rapún-Gárate, 2011; Thibaut et al., 2014).

On the other hand, the *heterodox approach to explaining choice behaviour* draws upon a wider social-scientific literature than neoclassical microeconomic theory (Downward and Riordan, 2007). The orthodox assumption of given individual preferences and individual tastes is challenged by Scitovsky (1976). According to this author, people enjoy creative activities – such as sports participation – because of the complex skills that are needed to practice them, and therefore sports participation can be a constant source of pleasant feelings such as 'surprise' and 'novelty'. The heterodox post-Keynesian approach refutes the orthodox assumption that economic agents act completely rational and individual (Downward, 2007). Agents face 'procedural' or 'bounded' rationality, as in most cases they do not have access to all information when making decisions or because they lack computational capabilities when analysing decisions for which too much information is available (Lavoie, 2004). Consequently, social habits are supposed to be important determinants in explaining human behaviour (Downward and Riordan, 2007). The heterodox approach also focusses on sociological influences as they explain human behaviour through concrete social situations and the construction of identities (Lera-López and Rapún-Gárate, 2011), where social pressure and habitus are more important than individual feelings. Ohl and Taks (2007) found that people buy sports goods to belong to a certain group, and to distinguish themselves from other people. It is hypothesized that individuals are explicitly and implicitly shaped through education by parents and by school (Bourdieu, 1984; Veblen, 1925), and through income.

The current study opts for a heterodox approach based upon a number of arguments. First, Scheerder and colleagues (2011b) suggest that social and psychological variables significantly contribute to explaining sports expenditure. Therefore, the use of a heterodox approach is the most suitable with respect to the data of this study. Second, Ohl and Taks (2007) pose that neoclassical models are less relevant for understanding the meaning and the diversity of consumption compared to heterodox models, while Downward (2007) and Downward and Riordan (2007) find more support for the heterodox category. Third, the literature overview of Downward and Rasciute (2010) demonstrates that heterodox theories have been popular in explaining and predicting sports participation.

3.2. Expenditure on sports participation: heterodox variables

While specific studies on cycling (expenditure) seem to be scarce, a high variety of general sports expenditure literature is at hand. Some of these studies focus on individual expenses in sports clubs (e.g. Wicker et al., 2010), while other take all sports contexts (club and non-club) into account (e.g. Lera-López and Rapún-Gárate, 2005), or focus on household sports expenditure (e.g. Thibaut et al., 2014).

A first set of variables that is commonly used in explaining sports expenses are sociodemographic variables. Sociodemographic determinants that are found to be positively associated with sports participation expenditure are the level of education (Dardis, Soberon-Ferrer and Patro, 1994; Lera-López and Rapún-Gárate, 2005; 2007; Scheerder, Vos and Taks, 2011c; Wicker et al., 2010), the level of income (Bloom, Grant and Watt, 2005; Casper, 2007; Lee, 2001; Lera-López and Rapún-Gárate, 2005; 2007; Wicker et al., 2010), and certain professions (Lera-López and Rapún-Gárate, 2007). It is also consistently found that men spend more money on sports participation than women (Lera-López and Rapún-Gárate, 2005; 2007; Scheerder et al., 2011c), except for sports club members (Wicker et al., 2010). A negative relationship is found for age (Dardis et al., 1994; Lera-López and Rapún-Gárate,

2007). At the household level, sports expenditure is positively related to the educational level of the household head (Thibaut et al., 2014), household income (Bloom et al., 2005; Dardis et al., 1994; Thibaut et al., 2014), having children (Bloom et al., 2005), age of the youngest child (Thibaut et al., 2014) and household size (Bloom et al., 2005; Dardis et al., 1994; Lee, 2001; Scheerder et al., 2011c), while expenditure per capita is negatively related to household size (Thibaut et al., 2014). The above results indicate that variables like sex, age, number of children, etc. are found to be significant cultural and social constraints in sports consumption (Lera-López and Rapún-Gárate, 2011; Ohl and Taks, 2007).

H1. Cycling expenses are positively influenced by the sociodemographic variables education, profession, sex, having a partner, and negatively by age and having children.

Ohl and Taks (2007) argue that the consumption of sports goods not only depends on sociodemographic variables, but that the taste of sports customers is more influenced by sports-related lifestyle variables and psychographic variables. The current study adds three groups of variables to the model, which we label as sports-specific intensity variables, socioeconomic cycling capital variables, and AIOs. The latter is in line with the study of Hallmann and Wicker (2015) who investigated the influence of motivation (measured on a 5-point Likert scale) on golf expenditure.

The sports-specific intensity variables describe the level at which cycling is practiced. Variables like the ability level (Casper, 2007), intensity and/or frequency of participation (Davies, 2002; Lee, 2001; Lera-López and Rapún-Gárate, 2007; Scheerder et al., 2011c; Wicker et al., 2010), being involved with sports (Bloom et al., 2005), level of involvement (McGehee, Yoon and Cárdenas, 2003) and sports club membership (Thibaut et al., 2014) have been found to influence sports expenditure significantly. Scheerder and colleagues (2011b) found a strong relationship between sports expenditure and the sports-specific variables, while the correlations with sociodemographic variables were weak. Accordingly the following hypotheses are posed:

H2a. Cycling expenses are positively related to the sports-specific intensity variables.

H2b. Sports-specific intensity variables have a more profound impact on sports expenditure than sociodemographic variables.

A third variable category is built around the so-called ‘socioeconomic cycling capital’, a term by which we seek to refer to the theory of Bourdieu (1984). These variables represent the knowledge about cycling goods and services. Downward, Hallmann and Pawlowski (2014) state that preferences can change by means of experience and by socialization through significant others (such as parents, friends, etc.). The current study hypothesizes that cycling capital gives cyclists insight in the scope of available cycling products and services, such that they are more convinced of the specific properties of certain products and thereby spend more money on it. With respect to the latter, it is also possible that a negative relationship is found because better informed agents know how to buy each product at the best price possible. The current study expects cyclists to gain cycling-specific knowledge from passive leisure activities (such as attending cycling courses, reading books, watching TV) on the one hand, and from active participation in cycling (cycling experience, training program) on the other hand. This results in the following hypotheses.

H3a. Cyclists who possess more active cycling capital (experience, using a training program) have higher cycling expenditure.

H3b. Cyclists who possess more passive cycling capital (reading literature, visiting websites, watching TV) have higher cycling expenditure.

The last category consists of AIO statements, i.e. constructs that represent people's feelings and thoughts about cycling participation and cycling consumption. Although research indicates that emotions contribute to explaining sports participation (Kang, Bagozzi and Oh, 2011), the influence of AIOs on sports expenditure is not often investigated. One of the exceptions is the research of Scheerder and colleagues (2011b), who found that a positive attitude towards sporting goods increases sports apparel expenses. Lera-López and Rapún-Gárate (2005) found that the motivations to participate in sports are important determinants of sports participation frequency. Therefore, it is proposed that:

H4. Positive feelings and thoughts towards cycling increase cycling expenditure, while negative feelings and thoughts decrease cycling expenditure.

4. Methodology

4.1. Data

The collected data originate from a large-scale internet questionnaire, which was carried out in Flanders in 2009. The respondents were contacted by means of email databases of cycling sports organisations, cycling forums, advertisements in cycling magazines and newsletters, etc. The main advantage of the method used is the large response (5,884 respondents, of which 5,157 cyclists), while a disadvantage is that this method often generates a non-representative dataset. Primary data were collected about their cycling habits, sociodemographic characteristics, cycling expenditure, and their opinion on statements about cycling (Scheerder et al., 2011a). Essential in this study is that cycling for utilitarian purposes (e.g. commuting by bike) is left out as the focus is solely on cycling as a leisure activity. Cycling variants that are incorporated in this study are recreational cycling, performance-based cycling, competition cycling, and specific variants of cycling (road bicycle racing, recreational cycling, spinning, indoor cycling, mountain biking, etc.).

4.2. Dependent variable

Cycling expenditure on both non-durable and durable goods was surveyed. In the questionnaire respondents were asked to fill in the amount of money that they had spent during the last year on nine different product and service categories that are normally purchased rather frequently, meaning at least once a year (Table 8.1, first part). Next, people were asked about seven categories of non-frequently purchased goods (Table 8.1, second part). The respondents had to fill in the actual purchase price divided by the expected lifespan of the product in years. By using this method one source of non-genuine zero expenditure can be excluded, namely infrequency of purchase.

4.3. Independent variables

Recalling our hypotheses, the explanatory variables are subdivided into four major categories, viz. sociodemographic variables (i), cycling intensity variables (ii), socioeconomic cycling capital (iii), and AIOs (iv). An overview of the first three categories is given in Table 8.2.

TABLE 8.1
Definition of the dependent variable total expenditure on cycling, which consists of both the frequent purchases and the durable goods

Frequent purchases	Bike rental and/or bike material
	Bicycle repair
	Clothes/sportswear (sports glasses included)
	Sports drink and food
	Information about cycling (magazines, books, etc.)
	Membership fee of a cycling club
	Membership of a fitness centrum
	Cycling events and bike races
	Other frequent expenses
Durable goods	Bike purchase
	Home trainer purchase
	Helmet
	Cycling shoes
	Cycling material
	Heart rate monitor
	Other durable goods

The *sociodemographic variables* are rather classic since they are often used in socioeconomic analyses: sex, age, having children, having a partner, education, and profession. The operationalization of these variables is straightforward (see Table 8.2).

The second category, *sports intensity*, defines how much cycling someone consumes. Variables belonging to this category are the average duration of a cycling tour, the number of cycling trips a week, the level at which the sport is practiced, the setting in which cycling is practiced, and the number of cycling variants that someone practices (regular biking, racing, mountain biking, indoor cycling, etc.).

Third, the *socioeconomic cycling capital* category is operationalized through variables that are taken to represent the sports-specific cycling knowledge of participants, more particularly watching cycling on television, following a personal training scheme, consulting cycling-related web pages, reading cycling literature, practicing other sports, and the number of years a respondent has been cycling. In Flanders, watching cycling on TV is potentially an important determinant, as cycling is one of the most popular spectator sports on TV. For example, Flanders has by far the highest Tour de France TV ratings (number of viewers related to the number of inhabitants) in the world, and seventy percent of the adult population has at least once been a spectator of the classic 'Tour of Flanders' (Van Reeth, 2013). With regard to cycling experience, one could expect experienced cyclists to have gained more knowledge about cycling goods and services and a more extensive social network compared to newcomers. We expect that people with a training schedule are more consciously involved in improving their level of performance, and therefore it is hypothesized that these cyclists spend more money on additional training methods, equipment (e.g. home trainer, heart rate monitor), food supplements, training camps, etc.

Fourth, cycling is an umbrella concept for a number of *cycling variants* (recreational cycling, road bicycle racing, mountain biking, bmx, etc.). Therefore, a control variable is added indicating which cycling variant the respondents associate themselves most with.

TABLE 8.2
Independent variables, namely sociodemographic variables, socioeconomic cycling capital variables, and cycling intensity variables

	Variable	***Description and/or categories***
Sociodemographic	Sex	*Male* (69.28%), *Female* (30.72%) (range 0-1)
	Age	Age of the respondents (mean 41.634; SD 14.252)
	Children	Having children: *No* (59.89%), *Yes* (40.11%) (range 0-1)
	Partner	Having a life-partner: *No* (30.71%) *Yes* (69.29%) (range 0-1)
	Education	Highest level of education: *Still at school* (11.53%), *First stage of secondary school or less* (9.05%), *Secondary school* (26.18%), *Higher education* (53.24%) (range 1-4)
	Profession	*Blue-collar* (11.17%), *White-collar* (74.54%), *Not in labour force* (14.30%) (range 1-3)
Intensity	Duration	Duration of an average ride: *<60 minutes* (17.01%), *60-119 minutes* (26.57%), *120-180 minutes* (33.20%), *>180 minutes* (23.22%) (range 1-4)
	Frequency	Number of times a week: ≤ *once a week* (33.12%), *1 till 3 times a week* (40.51%), ≥ *3 times a week* (23.36%) (range 1-3)
	Level	*Recreational* (60.70%), *Performance-based* (32.64%), *Competition* (6.66%) (range 1-3)
	Context	*Individual* (21.44%), *Light sports community* (42.83%), Sports club (35.73%) (range 1-3)
	Number of cycling variants	Number of cycling variants (mountain biking, spinning, bmx, recreational cycling, road bicycle racing, etc.) that one practices: *1* (32.37%), *2* (29.93%), *3* (19.94%), ≥*4* (17.76%) (range 1-3)
Cycling capital	Cycling on TV	Cyclist watches to cycling on TV: *No* (20.54%), *Yes* (79.46%) (range 0-1)
	Training program	Cyclist uses a written training program/scheme: *No* (88.72%), *Yes* (11.28%) (range 0-1)
	Literature	Cyclist reads cycling literature: *No* (64.49%), *Yes* (35.51%) (range 0-1)
	Website	Cyclist consults cycling websites: *No* (50.86%), *Yes* (49.14%) (range 0-1)
	Cycling years	Year that cyclist has begun with cycling: ≤*1990* (28.34%), *1990-1999* (25.43%), *2000-2004* (23.53%), *2005-2009* (22.70%) (range 1-4)
	Other sport	Cyclist practices also other sports than cycling: *No* (29.37%), *Yes* (70.63%) (range 0-1)
Control	Cycling variant	Principal cycling variant that one practices: *Recreational cycling* (48.88%), *Road bicycle racing* (39.86%), *Mountain biking* (9.18%), *Indoor cycling* (1.75%)

Finally, this paper also incorporates AIO variables into the regression. The AIO cycling statements used in the current research have already been validated for the specific case of running (Vos and Scheerder, 2009, with a Cronbach's alpha reliability of 0.75-0.81), which in their turn are based on broad statements used in previous research (e.g. Van Bottenburg, 2006). Respondents were asked to give their opinion

about a wide range of 62 cycling specific statements on a 5-point Likert scale, such that insight is provided in their motives and image of cycling. A pilot study has been carried out in order to investigate the comprehensibility of the AIOs. Next, these 62 items were broken down into five psychographic components by means of a principal component analysis with varimax rotation (Cronbach's alpha reliability 0.72-0.87). An overview of the different components is given in Table 8.3, along with a few examples of the statements that were asked.

TABLE 8.3
The AIOs health, real sport, cycling identification, cycling drop out and low thresholds

Variable (component)	***Description***	***Number of items***	***Average score (on 10)***	***SD***
Health	Cycling is a healthy sport (physically, mentally, condition, etc.)	10	8.136	1.254
Real sport	Cycling is a prototype of a real sport (cycling is for tough fellows, I practice cycling because of the prestige associated with it, etc.)	7	4.212	1.606
Cycling identification	Level of identification with cycling and solidarity with other cyclists (I am proud to be a cyclist, I have respect for other cyclists, etc.)	15	5.681	1.417
Cycling drop-out	Probability of giving up on cycling (There is a chance that I will quit cycling because of time lack, because it is too expensive, too dangerous, etc.)	10	2.946	1.694
Low threshold	Cycling is a sport that is easy to practice individually (cycling is a sport that is easy to fit in my daily schedule, cycling is a sport that is best practiced individual, etc.)	8	5.944	1.640

4.3. Statistical analysis

Expenditure data usually contain a relative large number of zero observations which causes the data to be left-censored such that the normality assumption of ordinary least squares regression is violated (Pawlowski and Breuer, 2011). The present dataset contains 4.4 percent zero observations, which is a significant but rather low proportion when compared to other expenditure studies. A number of methods are used to cope with left censored data, namely Tobit (Tobin, 1958), two-step Heckman, and Double Hurdle (e.g. Humphrey, Lee and Soebbing, 2010; Lee, 2001; Pawlowski and Breuer, 2011). This study opts for the Tobit model, because this model best suits the data, as the number of zero-observations (90 zeros) is too limited in relation to the number of independent variables to calculate the determinants of the dichotomous consumption decision. Tobit regressions will be calculated for all independent variables together, but also for each variable group while leaving out the other three variable groups.

5. Results

The average annual cycling expenditure of the respondents on all cost categories is €961.4 (SD=19.7). The last two columns of Table 8.4 stem from a Tobit regression that incorporates all variables at once,

TABLE 8.4

Tobit on the logarithm of the amount of money that is spent on cycling, per variable group (first two columns), and for all variables together (last two columns)

	Variable		*Tobit per variable GROUP*		*Tobit for ALL variables*	
			Estimate	*t-value*	*Estimate*	*t-value*
Sociodemographic	Sex	Female (ref.)				
		Male	1.68***	7.90	0.40***	3.34
	Age	Continuous	0.02*	2.08	0.01	1.70
	Children	No (ref.)				
		Yes	0.13	0.63	0.14	0.18
	Partner	No (ref.)				
		Yes	0.14	0.57	-0.17	-1.42
	Education	Primary	-1.03**	-2.90	-0.27	-1.51
		Secondary	-0.44*	-2.00	-0.15	-1.42
		Higher (ref.)				
	Profession	Blue collar (ref.)				
		White collar	0.30	0.93	0.07	0.46
		Not in labor force	-0.25	-0.57	-0.30	-1.37
Sports intensity	Duration	<60 minutes (ref.)				
		60-119 minutes	0.34	1.68	0.41**	2.83
		120-180 minutes	0.92***	4.59	0.38*	2.50
		>180 minutes	1.00***	4.74	0.46**	2.83
	Frequency	< once a week (ref.)				
		1 till 3 times a week	0.62***	3.99	0.44***	4.03
		≥ 3 times a week	1.04***	5.83	0.73***	5.43
	Level	Recreational cycling (ref.)				
		Performance-based	0.67***	4.42	0.31	0.28
		Competitive cycling	0.14	0.47	-0.51*	-2.17
	Context	Individual	0.11	0.56	-0.26	-1.81
		Light sports community	0.079	0.49	-0.20	-1.81
		Sports club (ref.)				
	Number of variants	1 (ref.)				
		2	0.20**	1.22	0.38***	3.21
		3	0.56***	2.82	0.38***	2.65
		≥4	1.26***	5.49	0.74***	4.45
Socio-econ. cycling capital	Cycling on TV	No (ref.)				
		Yes	0.59***	5.37	0.12	0.96
	Training program	No (ref.)				
		Yes	0.65***	4.81	0.17	1.13
	Literature	No (ref.)				
		Yes	0.86***	8.84	0.08	0.71
	Website	No (ref.)				
		Yes	0.88***	9.52	0.31***	2.99
	Cycling years	≤1990 (ref.)				
		1990-1999	-0.07	-0.63	0.09	0.76
		2000-2004	0.07	0.64	0.11	0.85
		2005-2009	0.01	0.05	0.97	0.73
	Other sport	No (ref.)				
		Yes	-0.06	-0.65	0.07	0.69
AIOs	Health	Continuous	-0.10**	-2.86	-0.03	-0.64
	Real sport	Continuous	-0.16***	-5.72	-0.05	-1.60
	Cycling identification	Continuous	0.58***	18.34	0.15***	3.22
	Cycling drop out	Continuous	-0.10***	-4.20	-0.07*	-2.45
	Low thresholds	Continuous	0.04	1.50	0.02	0.57
Control	Cycling variant	Recreational cycling (ref.)				
		Road bicycle racing	1.61***	17.43	0.41**	3.08
		Mtb	1.66***	10.90	0.56***	3.19
		Indoor cycling	1.06***	3.26	0.61	1.66

Note. *p<.05. **p<.01. ***p<.001.

while in the first two columns the Tobit regression is run on each of the variable groups separately (respectively sociodemographic, intensity, cycling capital, AIOs). With all variables included in the Tobit regression, the variables sex, trip duration, frequency, number of cycling variants practiced, visiting cycling websites, identification with cycling, being a mountain biker, and being a road bicycle racer positively determine cycling expenditure, while motivation to quit and competition are negatively associated with cycling expenses. With all explanatory variables included, sex is the only sociodemographic variable that significantly influences cycling expenditure. The other sociodemographic hypotheses were not confirmed when based upon the full Tobit model, so hypothesis 1 can only be partially confirmed. When only the sociodemographic variables are included, education and age turn out to be significant determinants of cycling expenditure as well. While the effect of education is in line with hypothesis 1, the positive age-effect is the opposite of what was expected.

Hypothesis 2a is confirmed, as cyclists spend more money when they participate in more cycling trips, when their cycling trips last longer and when they practice more cycling variants. In contrast with the sociodemographic variables, it does not matter whether all variable groups are included or not. Therefore, it can be stated that hypothesis 2b is confirmed, as more sports-specific variables influence cycling expenses than the socioeconomic variables do.

With all sports capital variables included, the only variable that turns out to be significant is whether one visits cycling-related websites or not. When a Tobit-regression is run with only the sports-capital variables, the other variables from the passive component also become significant, while the active components do not. We can conclude that cyclists who acquire cycling knowledge through passive leisure activities have higher cycling expenses (hypothesis 3b), while no significant relationship is found for the active component (hypothesis 3a).

Inclusion of the AIOs together with the other variable groups shows that people who associate themselves with cycling and with other cyclists turn out to be relatively big spenders, while the opposite holds for people who consider quitting from cycling. Both conclusions are in line with hypothesis 4. When the other variable groups are left out, the factors ‘health’ and ‘real sport’ have a negative relationship with cycling expenses. Apparently the AIOs are a relevant group in explaining sports expenses, a conclusion that certainly holds for cyclists who strongly identify themselves with their sports (hypothesis 4).

Finally, the incorporation of the control variable indicates that road bicycle racers and mountain bikers are bigger spenders than recreational cyclists.

6. Discussion

While most studies focus on (expenditure on) sports participation in general (e.g. Lera-López and Rapún-Gárate, 2007; Thibaut et al., 2014), recent research has focussed on specific sports activities which allows for exploring more specific variables than would be possible on an aggregated level (e.g. Hallmann and Wicker, 2015, Wicker et al., 2010). Variables that are often neglected in sports expenditure research turned out to be significant predictors of cycling expenditure, which is interesting in light of the ongoing search for explaining sports expenditure as suggested by Wicker and colleagues (2010). Indeed, in the present study, sociodemographic variables influence sports expenditure to a lesser extent than in other socioeconomic sports research (e.g. Lera-López and Rapún-Gárate, 2007; Thibaut

et al., 2014). The results indicate that cycling expenditure is more influenced by sports intensity variables and AIOs than by classic orthodox socioeconomic and sociodemographic variables. Apparently, sports expenses do not only stem from rational decisions as suggested by the orthodox economic approach, but are also influenced by how sports participants feel and think about sports participation (Downward and Riordan, 2007).

A closer look at the detailed regression results provides valuable insights in the cycling consumer behaviour. This opens up opportunities for market segmentation, which is a key element in effective marketing planning (Taks and Scheerder, 2006). Overall, the biggest spenders are male cyclists who cycle intensively, do not take part in competition, consult specialist web pages and identify themselves strongly with their sport and fellow cyclists. In line with Taks and Scheerder (2006) these results confirm that managers and marketers need to understand the reason 'why' people participate (namely identification) instead of solely 'who' is partaking. Indeed, marketing departments should meet the cyclist's need for identification, as intervening in the identification process turns out to be an effective strategy in raising the profit of companies. A closer look at the separate variable groups gives an insight in 'who' is spending money, and which categories could be targeted. A focus on older, higher educated cyclists, who watch cycling on TV, have a training program and/or read cycling literature could be a viable (supplementary) strategy for altering profits.

The results of the sports intensity variables provide interesting implications with regard to relationship marketing, implying that the acquisition of new customers is more expensive than retaining the current ones (Kim and Trail, 2011). Within the context at hand, and given our empirical results, this would for instance imply that commercial enterprises could consider cross selling strategies to convince road bicycle racers also to practise other variants like mountain biking or indoor cycling or to organize cycling clinics and competitive events to induce longer and more frequent cycling participation. For public authorities and federations, targeting health policy objectives (e.g. reducing obesity) could be cost effective strategy because participants who cycle because of health reasons spend less money.

While most of the above regression results are in line with expectations and/or previous research, three are not. First, the results for the variable 'level of participation' are at first sight contrary to the expectations, as competition riders are found to spend less money compared to recreational cyclists. A possible explanation might be that in Flanders many competitive riders are sponsored in kind, as they receive apparel, equipment and training services from the team they ride for.

Second, when all variable groups with the exception of the sociodemographics are excluded, more variables turn out to be significant predictors of cycling expenditure. Age has a small but significant positive effect on cycling expenditure. This suggests that older cyclists spend more money on sports participation, which is in conflict with the results of other research (Dardis et al., 1994; Lera-López and Rapún-Gárate, 2007). A possible explanation is the fact that only a small part (five percent) of our sample is older than 65. We can expect that the majority of the cyclists for whom age is a constraint already quit cycling at that age and consequently did not take part in the questionnaire.

Third, it is counter-intuitive that cyclists who define cycling as a prototype of a real sport spend less money. Additional analyses nuance this conclusion, as total expenditure is positively correlated with the variable 'real sport'. But if only the AIOs are included, the relationship becomes significantly negative,

indicating that the cause of the negative relationship should be situated in the positive explanatory power of the other AIOs (which are health, cycling identification, cycling drop out, low thresholds).

7. Conclusion

While expenditure studies on overall sports participation and sports expenditure are rather abundant, less research is available on specific recreational activities (Lee, 2001). This paper aimed to fill that gap in the literature with regard to cycling, a popular sport that defines an important and growing market.

The investigated determinants were grouped into four categories, namely sociodemographic, sports intensity, sports capital and AIOs. While the variables of the former two categories are included in most socioeconomic research on sports participation, the last two categories contain a large number of variables that have rarely been investigated in previous sports expenditure research. The results indicate that more sports intensity variables turned out to be significant contributors compared to the other variable groups. When expenditure is analysed within each specific group of variables separately, numerous significant results are found. The current study thus supports the use of a heterodox approach in modelling total cycling expenditure, which is in line with conclusions and suggestions of previous research (e.g. Downward, 2007; Scheerder et al., 2011c).

From a policy and business point of view, the results of this study are useful for the segmentation process of the management of sports governmental bodies, sports federations and commercial enterprises. Overall, the results indicate that the biggest spenders are male cyclists, who cycle intensively, consult specialist webpages and identify themselves strongly with their sport and fellow cyclists. These results could prove to be interesting for market segmentation purposes. For public authorities, it is interesting to know that participants who cycle because of health reasons seem to spend less money on cycling-related matters. Moreover, cycling expenses seem to be rather independent of sociodemographic factors, and therefore, from a socioeconomic point of view, cycling can be seen as a democratized sport that lends itself to obtain certain policy objectives (e.g. reducing obesity).

A limitation of the current study is that, although a large number of variables are included, income is not. Yet, both in the neoclassical and in the heterodox approach, income is often seen as an important determinant of cycling expenditure. Although income is correlated with seniority (variable age), education and kind of profession, we suggest that future research should focus on orthodox and heterodox variables that have been included in the current research, along with the variable income.

Given the aim of this study to investigate a large number of potential variables, and given the used method (Tobit regression), a large number of respondents is needed. An internet survey among cyclists is an ideal way of doing so. A disadvantage of this type of data collection is that it results in a biased sample as it is not necessarily representative for the total population. Furthermore, although cycling is a popular sport in Western countries, regional differences are likely to exist. Therefore, it would be interesting to investigate these variables in different countries. Future research should also focus on other popular sports activities such as running, swimming or fitness, or on relatively expensive sports such as horseback riding, or golf (e.g. Hallmann and Wicker, 2010).

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SECTION 4

EXPLORING ALTERNATIVE DATA GATHERING METHODS

CHAPTER 9
The Purchase Price of Runners' Sports Apparel: Combining Observational and Survey Data at Running Events (Paper 6)

This chapter is submitted as a paper to an international peer-reviewed journal

Thibaut, E., Vos, S, & Scheerder, J. (2016). The purchase price of runners' sports apparel. Combining observational and survey data at running events.

1. Abstract

The aim of the current study is twofold. First, it investigates the influencing factors of the runners' sports apparel value at a running event. Second, the potential value of observational data in the socioeconomic field is investigated, as this study combines data retrieved by a survey and by visually scanning pictures of running event participants. The results demonstrate that visual data gathering methods contribute in explaining sports apparel usage and consumption. For example, it is found that runners who wear a shirt of the running event spent less money on their running shoes and overall sports apparel. Other advantages (e.g. less non-response, less selection bias, less recall bias, time-efficiency for research subject, potential automatic computer analysis in future) and disadvantages (e.g. technical issues, labor intensiveness for researcher, privacy) of visual data are discussed.

2. Introduction

Today, running is a popular leisure activity in Western countries (Borgers, Vos, & Scheerder, 2015; Annear, Cushman, Markert, & Rho, 2014). In 2005 approximately 29.2 million US citizens were running (Humphreys & Ruseski, 2009) according to the National Sporting Goods Association. In the European Union the number is estimated at 50 million in 2013 (Breedveld, Scheerder & Borgers, 2015). After the first (late 1960s) and second (end of the 1990s) running boom, which were mainly driven by adult and middle-aged men, it seems that in recent years a third wave has started, and this time youngsters and females are taking the lead (Scheerder, Breedveld, & Borgers, 2015). The focus is now more on special running events such as off-road races, ladies runs and urban trails (Scheerder, Breedveld, & Borgers, 2015), while numbers indicate that the proportion of women participating in 10 kilometer running events is increasing (Annear, Cushman, Markert, & Rho, 2014). The differentiation in running events makes that groups of participants with other running motivations are getting involved (Frederick & Ryan, 1993). A prime reason for the risen number of running participants should be situated in the fact that running is a sport that can be practiced in a rather informal, unorganized way, such that people can choose where, how and with whom they will go for a run (Borgers, Vos, & Scheerder, 2015; Delnoij, 2004).

The combination of the high number of running participants and the expenses of these runners makes that running has become a big industry. In the European Union, it is estimated that the total annual expenditure on running amounts to 8 till 11 billion euros (Breedveld, Scheerder, & Borgers, 2015). Other figures indicate that the economic impact of mass sports participation events is equal to, and even greater than, the one of elite sports events (Coleman & Ramchandani, 2010). Given the economic importance of running, the first aim of this study is to investigate the influencing factors of the purchase price of the sports apparel (clothing, footwear, equipment) that is used by event runners, as the segmentation of sport (running) participants is essential for sports enterprises and sports policy makers. Previous research has focused on determining the influencing factors (e.g. age, sex, income, education, opinions, motivations) of sports expenditure.

The majority of the sports participation studies uses (online) questionnaires (e.g. Hallmann & Wicker, 2012) to survey the (running) participants about these (often latent, non-visible) background characteristics (Bollen, 2002; Wansbeek & Meijer, 2000). Nevertheless, the tsunami of data emerging from new information sources implies that social sciences such as economics will be fundamentally transformed (Keller, Kookin, & Shipp, 2012). Through new technologies such as smartphones, social networks, etc. large amounts of visual data are generated. This also applies to the specific case of event running, as most event organizers take pictures of the participants, and share them via their website or social media. Moreover, computer vision has made rapid advances during the last decades (Borji & Itti, 2014), such that today several companies have the know-how to automatically explore pictures such that faces, objects and even abstract concepts can be retrieved. Therefore, by combining survey results with visual image scanning, the second aim of this study is to investigate the potential advantages of the observation method. The rapid developments in visual information scanning need to be researched, also because these technological evolutions are related to issues such as privacy-problems.

3. Literature

While surveys are a reliable data-gathering method (Bollen, 2002; Wansbeek & Meijer, 2000), Keller, Kookin and Shipp (2012) argue that in some cases, they are not the most efficient method. They pose that today large amounts of data are gathered by modern technologies, and that these ‘big data’ are immediately at the hand of researchers. Based on these data, the choices that users make can be analyzed at both a personal and a group level (Vos, Janssen, Goudsmit, Lauwerijssen, & Brombacher, 2016; Vos, Janssen, Goudsmit, Bovens, & Lauwerijssen, 2015), thereby creating opportunities to understand complex human behavior in everyday life (Keller, Koonin, & Shipp, 2012). A prime example of these new technologies and the data that they provide are the running events’ usage of visual media as a tool to increase the runners’ experience. While taking and sharing pictures between the event organizers and the participants has become standard practice, innovative mass sports events are experimenting with sharing movies, and live-posting of pictures on the social media profiles of the sports participants. In summery we can state that the combination and integration of data gathered via different methods (i.e., data fusion) offers new possibilities to analyze behavior patterns (Peeters & Megens, 2014). In the next two sections, we will discuss the (dis)advantages of both the survey method and the observation method, the two data-gathering methods used in the current study.

3.1. Survey method

In the social sciences, surveys are by far the most used method to explain, understand and predict human behavior (Bollen, 2002). Questionnaires are considered to be a good instrument to gather data about latent (e.g. consumer preferences, productivity, efficiency) and visually unobservable (e.g. income, age) characteristics (Bollen, 2002; Wansbeek & Meijer, 2000). The implicit assumption is that the surveyed non-observable characteristics influence and/or determine observable outcome variables (Bollen, 2002) such as for example the purchase price of sports apparel at running events. Other advantages are the wide applicability of survey research, its cost-efficiency and the low participation burden for the respondents (Bolger, Davis & Rafaeli, 2003).

In literature, a number of drawbacks of survey methods are mentioned. First, previous sports expenditure studies (see also the studies listed below in the second part of the literature review) demonstrate that the explanatory power of survey research is often (very) low, with numbers between zero and twenty percent of explained variance (Breuer, Hallmann, & Wicker, 2011). Therefore, the current study investigates whether surveyed characteristics (sociodemographic and socioeconomic determinants) can be combined or even exchanged for alternative (observational) variables in explaining (expenditure on) sports apparel. Second, not every respondent is prepared to sacrifice time to complete a questionnaire (Breuer, Hallmann, & Wicker, 2011), resulting in considerable non-response. The latter is one of the main causes of sample selection bias, as for the case of running it can be expected the survey participants are more dedicated runners who are more willing to express their opinion/feelings towards one of their prime leisure pastimes. Third, the survey method relies on the assumption that respondents fill out the questions objectively and honestly, and that they are capable of expressing and recalling the events that are issued. Nevertheless, this is not necessarily the case, as social desirability (Breuer, Hallmann, & Wicker, 2011), telescoping (Sudman & Bradburn, 1973) and recall bias (Bolger, Davis, & Rafaeli, 2003; McKenzie, 2009) result into over- or underreporting. The latter is the case when people are asked about their sports apparel expenditure, because a significant proportion of the sports participants do not remember the actual purchase price of a certain good. The fact that sports consumption studies often use extensive reference periods (e.g. one year) increases this effect, as memory decays exponentially over time (Sudman & Bradburn, 1973).

3.2. Observation

The observation method has historically been overlooked in the field of physical activity and sports participation. While a number of studies use observation to investigate sponsorship exposure in spectator sport (e.g. Clavio, Kraft, & Pedersen, 2009), no socioeconomic studies are found that use observational data of mass sports participation. A possible explanation for this blind spot could be the time invasiveness (McKenzie, 2002) of observing sports participants, as it is hard to find an acceptable research population for sports activities that are practiced with a limited number of practitioners per sports infrastructure/game/event. For example, per 90 minutes of a soccer game, only 22 soccer players can be observed. The advantage of running events is that all participants start at the same moment and pass by the same spots in the race, making it straightforward for taking pictures of a relatively large amount of runners in a short period of time.

Nonetheless, in literature numerous arguments can be found why incorporating observational data in (socioeconomic) sports studies could turn out to be interesting. First, a number of studies lists the general

advantages of observation, which are applicable to the field of sports participation, and sports consumption in particular. For example, visual data gathering methods correct for non-response, selection bias and recall bias, while it also invokes less (no) time of the respondents (McKenzie & van der Mars, 2015). Also, observation provides contextually-rich data (McKenzie, 2009) thereby opening promising opportunities concerning observation at sports events. Other advantages of this method are its high internal validity, and the possibility to check for inter- and intra-observer reliability (McKenzie, 2002). Second, some disadvantages that can be associated with surveys can be tackled by using an observation method. By observing sports apparel usage at running events, it is for example possible to correct for non-response, over- and underestimation/reporting, and recall bias (Breen, Bull, & Walo, 2001; Heinemann, 1998). Also, the time invasiveness of completing questionnaires is often a burden for taking part in socioeconomic participation studies. A visual analysis of participant's pictures in running events does not ask the time and effort of the respondent, and could, therefore, open new opportunities for researchers. This also implies that observation allows researchers to include the full population (e.g. all participants of a running event) in their studies. Third, and specific to the field of sports participation research, Peeters and Megens (2014: 34) suggest that relevant characteristics can be deduced from pictures of runners, that are correlated with figures about their attitudes, interests and opinions (AIOs) towards running. As visual characteristics are observable, they are less open to interpretation. Fourth, visualization tools have improved rapidly. It is expected that future technological advances will permit automatic analysis of pictures by computers, which could generate a large amount of data without much effort (McKenzie & van der Mars, 2015). In the field of top-level sport, Jensen (2012) already used an automatic scanning tool (developed by Margaux Matrix Limited) to analyze sponsorship exposure during broadcasts of elite sport golf tournaments. Programs are being developed for automatic picture analyzation, and it seems probable that shortly they will be at hand for research and marketing purposes (McKensey, 2002). In some tasks such as frontal-view face recognition, change detection, etc. computers already outperform humans (Borji & Itti, 2014).

3.3. Determinants and hypotheses

To investigate the determining factors of running apparel consumption, a heterodox socioeconomic approach is chosen. This is because heterodox approaches explore a wider variety of variables, by incorporating economic, sociological and psychological theories, approaches and variables (Downward, 2004). Indeed, the current study assumes that runners wear sports clothing, shoes, and other sports apparel that are not necessarily the most effective and/or efficient to complete a 5K or 10K running event, but that their sports apparel choices also reflect (both consciously and unconsciously) certain sports-related lifestyle characteristics (Scheerder, Vos, & Taks, 2011). Therefore, it is assumed that the event runners wear sports apparel that reflects the way they think and feel about running, and thereby the purchase price of their sports outfit.

Numerous survey-based studies focus on the determinants of overall sports participation (for an overview see Breuer, Hallmann, & Wicker, 2011), sports expenditure (for an overview see Thibaut, Vos, & Scheerder, 2014) or sports apparel expenditure (Scheerder, Vos, & Taks, 2011). On the contrary, no specific studies about the influencing factors of running expenditure are found, while only a few studies investigate the influencing factors of running. The variables gender (male), age, education, nationality, marital status, involvement, opinions about running (e.g. Borgers, Vos, & Scheerder, 2015; Breuer, Hallmann, & Wicker, 2011; Bryant, 1987; Funk, Toohey, & Bruun, 2007; Hallmann & Wicker,

2012) are found to be positively related to running. Based on the determinants of overall sports consumption, classic socioeconomic and sociodemographic variables are investigated (e.g. age, gender, education, income), while also sports-specific variables are included as suggested by Breuer, Hallmann and Wicker (2011). Both heterodox economic theory and empirical findings suggest that sports participation and thus consumption are more accessible to the dominant social groupings. It is therefore expected that low income levels, gender (female), age and low level of education are constraints for running expenses while more dedicated runners (in terms of time spent on running, intensity, etc.) are bigger spenders.

The relation between running consumption and observational background variables is less clear, as almost no previous research has focused on comparable variables. An exception is the running distance of the event (i.e. 5K versus 10K), that can be typified as a proxy variable for the running intensity. Because on average more practice is needed for the 10K, these event runners are believed to be the biggest consumers. For the sports apparel variables (i.e. wearing certain types of sports goods or not) it is assumed that the runners (subconsciously) express how they think and feel about running (e.g. Downward, 2004; Veblen, 1925) and which running segment they belong to (Bourdieu, 1979). For example, based on cycling data Thibaut, Vos, Lagae, Van Puyenbroeck and Scheerder (2016) found that cycling-participation for health benefits is associated with lower cycling expenses, while cyclists who identify themselves with their sport spend relatively more. Accordingly, it is expected that runners who take part in running events for fun, excitement, and/or living an active 'healthy' life spend less money on sports participation, while the opposite goes for runners with a strong identification with their sport who try to gain a specific place or time. Applied to the observational characteristics, running belts and specialized running shoes are supposed to be positively related to sports expenditure, while the opposite goes for runners wearing event-T-shirts, in-ear headphones, and smartphone armbands.

4. Method

4.1. Data

The data in this research stem from the running event 'Bollekesloop', organized on the 14th of September 2014. The event took place in Antwerp, which is the biggest city in the Dutch-speaking part of Belgium, Flanders. In total 293 runners participated in the 5K tour, and 673 in the 10K. Only the results of the adult runners are incorporated in the current study, leaving out the 6.3% of the respondents that were younger than 18 years old. Although ethical approval is not required in Flanders, the research has been talked over with the authorized ethical commission. The research is based on publicly available information (pictures) combined with classic survey research, all of which is conducted in line with the Helsinki Declaration.

In the first stage of our research, numerous pictures were taken of each participant, front and back. In the second stage of the study, the running participants were asked to fill out a questionnaire regarding sociodemographic, socioeconomic and sports-specific characteristics. One of the questions was about the purchase price of the sports apparel that runners were wearing at the event, more particularly the price of their shoes, clothing, heart rate monitor, other electronic devices (e.g. smartphone, music player, etc.), and finally other sports goods (e.g. running belt). In total, 339 runners (35.1%) filled out the survey. Before the race, every participant had to pin up the race number on their chest and back, implying that

this number can be visually detained from the picture. Because this number was also asked in the survey, the race/event number of the participants could be used to combine the observational data with the survey data. The participant's pictures were also scanned on characteristics like the type and brand of the running shoes and clothing, and whether a sports watch, smartphone, etc. were used.

4.2. Variables and analyses

The dependent variables in the binary statistics and the regressions are the total purchase price of the sports apparel (ALL), and the purchase price of the sports clothing (CLOTH), of the running footwear (FW) and the heart rate monitor (HR) (See Table 9.1). The other two sports apparel categories (purchase price of other electronic goods, purchase price of other goods) are not analyzed separately, because of excess zeros. The dependent variables ALL, CLOTH and FW are analyzed using ordinary least squares. Because of the relatively large amount of zeros in the latter category (63.1%), a Tobit model is preferred as the normality assumption of OLS is violated.

The left side of the second part of Table 9.1 contains determinants that are deduced from observational information, more particularly from the visual information that is obtained by scanning the pictures. The variable 'event-T-shirt' describes whether a runner wore the event-T-shirt that they received in exchange for subscribing to the event, or not. The other variables indicate whether participants used short pants (vs. long pants), tight pants, running shoes (vs. normal, non-running shoes), in-ear headphones, running belts (for drinks/food), sports watches, headwear and a smartphone band. The operationalization of the variable 'running shoe brand' is less straightforward. This variable categorizes the brands into four categories, based on a combination of the typologies of Smits, Scheerder and Lagae (2009) and Xing (2015). A first running shoe group clusters the commercial brands, such as Adidas and Nike. These brands are well-known worldwide brands that not only focus on sports participation but on a wide range of (sports and leisure) products. The technical brands such as Asics, Saucony, Brooks, Mizuno and New Balance have a prime focus on running. The third category consists of the white brands (e.g. Kalenji) while the fourth category are the brands for which no logo was recognized in the pictures. The numbers in Table 9.1 clearly demonstrate that some of the observational characteristics were only used by a small number of runners, for example 'other than running shoes' (2.7%), running belts (1.6%) or headwear (4.2%). Although these small frequency rates imply that probably no significant influence on the purchase price of sports apparel will be found, they are nevertheless incorporated in this study because the mean values (see below in Table 9.2) could give an idea whether significant differences can be found when more participants would be observed with a running belt or headwear (e.g. events with more participants, multiple events combined, other weather conditions, etc.).

The right side of Table 9.1 is gathered by means of an internet survey, and contains classic sociodemographic (age, sex) and socioeconomic (education, income) variables. Also a number of sports-specific variables are included, namely the context one normally runs in, the duration and frequency of the training sessions, whether it was the first participation in the Bollekesloop or not, the number of running events the runner has participated in last year and whether one practices also another sport or not.

TABLE 9.1
Descriptive results of the dependent (N=336) characteristics, and the independent observational (N=945) and survey characteristics (N=336)

Dependent variables

	Mean (€)	SD (€)	Number of zeros
All sports apparel	349.3	13.8	2
Clothing	56.8	3.7	40
Footwear	119.5	2.0	4
HR-monitor	63.2	5.8	214

Independent variables

Observation		In %	Survey		In %
Distance	*5K*	29.4	Age	*19-25*	8.3
	10K	70.6		*27-39*	29.4
Shirt Event	*Yes*	28.6		*40-54*	42.8
	No	71.4		*>54*	19.5
Short pants	*Yes*	80.7	Sex	*Male*	67.2
	No	19.3		*Female*	32.8
Tight pants	*Yes*	43.2	Education	*Low*	32.6
	No	56.8		*Middle*	30.4
Running shoes	*Yes*	97.3		*High*	37.0
	No	2.7	Income	*<2000€*	24.6
Running shoe brand	*Commercial*	21.8		*2000-3499€*	24.7
	Technical	63.4		*3500-4199€*	25.7
	White brand	9.0		*>4199€*	25.0
	Not recognizable	5.8	Context	*Alone*	23.0
In-ear headphone	*Yes*	15.0		*Friends/Family*	55.3
	No	85.0		*(In)formal running group*	21.7
Running speed	*<10 kph*	26.5	Average min/training	*1h or less*	66.0
	10-12 kph	40.3		*>1h*	34.0
	>12 kph	33.2	Frequency	*≤ once a week*	25.3
Running belt	*Yes*	1.6		*twice a week*	37.0
	No	98.4		*≥ 3 times a week*	36.7
Sports watch/HR	*Yes*	43.1	First time	*Yes*	47.0
	No	56.9		*No*	53.0
Headwear	*Yes*	4.2	Number of events	*1*	13.5
	No	95.8		*2-5*	48.4
Smartphone armband	*Yes*	11.4		*>5*	38.1
	No	88.6	Other sport	*Yes*	60.0
				No	40.0

5. Results

Table 9.2 lists the bivariate statistics (ANOVA, t-tests) with the purchase price of the sports apparel as the dependent variable, and the survey and observational background characteristics as the independent variables. The purchase price of the running apparel does not vary much across the classic socioeconomic and sociodemographic variables, while the sports-specific survey variables and the observational variables do have distinctive power.

Based on the observational background variables, the following differences were found. Runners who were dressed with the event-T-shirt wore less expensive sports apparel (ALL, FW, CLOTH, HR), while the opposite goes for runners with a sports watch (ALL, FW, CLOTH, HR). The purchase price of overall sports apparel (ALL) is also higher among event runners with running shoes, technical shoe brands, in-ear headphones, running belt and a smartphone band. 10K runners with tight pants, a sports watch and technical shoe brands have more expensive shoes (FW). For CLOTH, no other differences than 'event-T-shirt' and sports 'watch/HR monitor' are found. Logically, runners that were observed to wear a sports watch, were found to have a higher value of HR. Other positive determinants are running the 10K instead of the 5K and running at a faster speed, while in-ear headphones and smartphone armbands are negatively related. A possible explanation is that the latter objects, related to the use of a smartphone application, can be seen as substitutes for HR-monitors and/or sports watches.

The only socioeconomic determinants that were found to impact one of the sports apparel purchase prices are age (youngsters have cheaper FW) and being male (on HR). With respect to the sports-specific variables, individuals that are 'more intensive' runners, wear more expensive sports apparel, as demonstrated by the fact that runners who opt for longer training sessions, more training sessions a week, and more frequent participation in sporting events have a positive impact on the purchase price of all categories of their sports apparel (ALL, CLOTH, FW, HR).

Table 9.3 gives an overview of the regression results for the purchase price of all sports apparel (ALL), clothing (CLOTH), footwear (FW) and sports watch/HR monitor (HR) that the event runners wore during the event. For each sports apparel category, three regressions were run, more particularly one with only the observational characteristics (O), one with the survey characteristics (S) and finally one with both variable groups combined (O+S). Overall we can state that the regression results confirm the binary statistics of Table 9.2. For example, the results again indicate that more significant differences are found for the observational and sports-specific survey characteristics than for the socioeconomic and sociodemographic determinants. This especially holds when all variables (O+S) are included. The adjusted R^2 also demonstrates that the observational characteristics contribute in explaining the purchase price of the event runners' sports apparel.

TABLE 9.2
ANOVA and t-tests for the purchase price of all sports apparel (ALL), of footwear (FW), of clothing (CLOTH) and sports watch/HR monitor (HR) by observational and survey characteristics

Determinant		ALL	FW	CLOTH	HR
Distance	*5K*	330.6	109.6**	67.6	44.0*
	10K	372.7	125.3**	55.6	73.7*
Shirt Event	*Yes*	279.1***	107.5***	46.7*	47.2*
	No	388.2***	125.9***	61.9*	72.6*
Short Pants	*Yes*	371.4	122.7	60.4	71.8
	No	329.4	117.4	50.5	47.2
Tight pants	*Yes*	380.8	126.6**	64.0	73.6
	No	342.7	116.1**	52.1	59.2
Running shoes	*Yes*	366.5*	105.9	58.8	67.1
	No	206.6	122.0	38.6	53.6
Brand shoes	*Commercial*	326.6	105.5**	47.9	50.1
	Technical	395.6**	132.8***	64.7	72.7
	White brand	213.0	78.3**	40.2	52.7
	Not recognizable	396.6	102.6	41.9	73.4
In-ear headphone	*Yes*	476.1***	118.3	51.8	44.6*
	No	337.9***	122.4	59.8	71.7*
Running speed	*<10 kph*	317.1	120.1	58.3	38.5***
	10-12 kph	389.2	119.9	57.0	67.4
	>12 kph	372.3	124.9	60.0	90.2
Running belt	*Yes*	517.4*	121.8	70.7	130.9
	No	359.4*	116.4	58.1	65.4
Sports watch/HR monitor	*Yes*	413.5***	128.8***	64.8*	113.8***
	No	302.1***	113.8***	50.7*	10.8***
Headwear	*Yes*	517.4	133.9	78.6	77.7
	No	359.4	120.9	57.2	66.2
Smartphone armband	*Yes*	540.2***	123.8	58.7	25.5**
	No	337.9***	121.3	58.3	72.6**
Age	*19-25*	360.0	99.4**	43.7	48.5
	27-39	372.7	117.9	70.3	61.9
	40-54	366.5	127.8	57.1	70.8
	>54	351.0	123.9	51.9	77.3
Gender	*Male*	372.1	120.9	58.5	76.6*
	Female	349.9	124.5	59.8	49.3*
Education	*Low*	390.1	127.7	72.3	82.9
	Middle	353.5	121.3	51.2	57.7
	High	348.5	117.7	53.0	61.2
Income	*<2000€*	352.5	117.1	71.6	69.3
	2000-3499€	307.1	122.2	53.6	48.5
	3500-4199€	389.5	123.9	53.5	75.6
	>4199€	400.6	125.3	63.2	68.0
Context	*Alone*	375.6	119.2	53.7	66.7
	Friends/Family	301.9	114.6	51.1	44.3
	(In)formal running group	388.2	133.2**	73.8	86.4
Average min/training	*1h or less*	418.5**	116.7***	50.6**	49.9***
	>1h	334.3**	133.4***	73.6**	99.6***
Frequency	*1/week or less*	257.4**	105.4***	42.4	38.5
	2/week	348.2**	123.2	54.0	40.4
	3/week	451.7***	131.8	74.0**	112.2***
First time	*Yes*	337.9*	114.7**	45.5***	54.8*
	No	386.5*	127.8**	70.1***	77.7*
Number of events	*>1*	297.9	104.1**	34.0	13.4
	2-5	336.9	120.7	52.9	54.7
	>5	419.5**	129.0	74.0**	101.2***
Other sport	*Yes*	375.5	115.8*	57.2	69.0
	No	352.0	125.4*	60.0	64.0

Note. *p<.05. **p<.01. ***p<.001.

TABLE 9.3

OLS (purchase price of all sports apparel (ALL), clothing (CLOTH), footwear (FW)) and Tobit (purchase price of HR-Monitor(HR)) regression results for observational (O), survey (S), and observational plus survey (O+S) characteristics

Determinants	**ALL**			**CLOTH**			**FW**			**HR**		
	O	***S***	***O+S***	***O***	***S***	***O+S***	***O***	***S***	***O+S***	***O***	***S***	***O+S***
Distance (*5K*=ref.)												
10K	-40.9		-74.7	-25.0*		-30.6*	5.9		4.0	20.8		-25.9
Shirt Event (*No*=ref.)												
Yes	-68.9*		-37.9	-11.0		-3.2	-9.8		-9.2*	8.7		21.7
Short pants (*No*=Ref.)												
Yes	22.7		10.7	18.6		22.6	2.6		5.3	-4.8		-20.3
Tight pants (*No*=Ref.)												
Yes	25.4		6.6	12.6		11.2	6.4		-0.6	17.6		13.3
Running shoes (*No*=Ref.)												
Yes	136.3		141.7	25.9		29.2	-6.8		-13.9	69.0		66.1
Brand shoes (*White brand*=Ref.)												
Commercial	102.7		67.0	13.3		5.3	25.2***		21.7**	-53.8		-68.3
Technical	151.8**		120.9*	25.1		17.6	48.7***		43.2***	-16.4		-28.3
Not recognizable	97.2		55.8	11.0		2.8	20.9		19.5	-15.1		-37.9
In-ear headphone (*No*=Ref.)												
Yes	126.8***		158.2***	-4.4		2.1	-2.3		2.0	-2.0		-11.2
Running speed *(<10kph*=Ref.)												
10-12 kph	21.7		5.1	-3.0		-8.4	-3.0		-6.0*	24.3		9.6
>12 kph	11.8		-2.9	-2.1		-5.9	-2.0		-3.3	9.2		-4.3
Running belt (*No*=Ref.)												
Yes	138.8		109.1	19.2		15.3	0.2		-6.2	126.5		103.7
Sports watch/heart rate monitor (*No*=Ref.)												
Yes	109.1***		81.6**	11.1		3.1	9.8*		5.8	304.5***		294.5***
Headwear (*No*=Ref.)												
Yes	35.5		25.2	20.6		17.0	5.2		-5.4	35.4		22.0
Smartphone armband (*No*=Ref.)												
Yes	175.9***		125.1**	3.2		-9.5	4.5		2.9	-93.3*		-87.3
Const.	90.1		107.3	46.4		40.0	84.0***		65.1**	-357.6		-404.7*

Note. *p<.05. **p<.01. ***p<.001.

TABLE 9.3 *(continued)*
OLS (purchase price of all sports apparel, clothing, footwear) and Tobit (purchase price of HR-Monitor) regression results for observational (O), survey (S), and observational plus survey (O+S) characteristics

Determinants	**ALL**			**CLOTH**			**FW**			**HR**		
	O	***S***	***O+S***	***O***	***S***	***O+S***	***O***	***S***	***O+S***	***O***	***S***	***O+S***
Age (*>54*=Ref.)												
19-25		-49.6	-64.6		20.6	19.9		9.5	9.8		35.8	4.6
27-39		-119.0	-110.9		-14.3	-16.9		11.0	9.4		-21.7	-38.1
40-54		-138.7*	-109.2		-31.4	-31.1		7.1	7.4		-1.8	-59.9
Sex (*Male*=Ref.)												
Female		-4.4	-12.2		6.0	2.5		8.1	6.6		-42.6	-15.2
Education (*Low*=Ref.)												
Middle		-31.4	-16.4		-23.5*	-21.0		0.7	-0.6		-55.3	-40.7
High		-79.0*	-48.5		-24.9*	-19.1		-6.1	-6.2		-39.7	-14.2
Income (*<2000€*=Ref.)												
2000-3499€		5.2	-1.2		-8.9	-9.4		5.1	6.3		-25.9	-33.3
3500-4199€		95.5*	83.2*		-4.0	-3.3		9.2	7.5		80.6	60.2
>4199€		111.9*	112.1*		0.8	-4.3		9.0	6.9		74.9	48.3
Context (*Alone*=Ref.)												
Friends/Family		-29.7	-18.0		0.5	-3.5		-3.9	-7.0		1.0	-18.8
(In)formal running group		-24.6	-5.6		10.4	4.1		4.6	1.0		-27.5	-10.3
Average min/training (*1h or less*=Ref.)												
>1h		74.2*	68.7*		20.8*	22.8*		4.3	4.5		76.0*	64.0*
Frequency (*1/week or less*)												
2/week		71.8	27.1		9.3	4.1		15.4**	10.1*		24.0	-24.7
3/week		183.4***	139.6***		21.9	17.7		24.3***	14.9**		125.7**	43.8
First time (*No*=Ref.)												
Yes		-47.3	-30.6		-27.0	-24.6**		-9.0*	-6.9		-6.8	12.7
Number of events (*1*=Ref.)												
2-5		16.1	54.3		10.2	21.3		13.4*	10.5		102.6	111.9*
>5		45.6	77.9		19.2	33.5*		12.3	9.4		159.5**	170.2**
Other sport (*No*=Ref.)												
Yes		-37.1	-32.9		-6.9	-9.0		7.1	3.6		-1.7	-2.4
Const.		285.9**	107.3		41.0	40.0		67.3	65.1**		-260.3*	-404.7*
Adj R2	0.2449	0.1269	0.1959	0.016	0.1003	0.2067	0.2462	0.1509	0.3047	0.0714	0.0331	0.0911

Note. *p<.05. **p<.01. ***p<.001.

6. Discussion

Although questionnaires are valuable instruments to gather data about visually unobservable (income, age, training duration, etc.) characteristics (Bollen, 2002; Wansbeek & Meijer, 2000), the current study demonstrates that observational characteristics have potential in explaining human behavior, such as sports apparel in this case. Indeed, consumption patterns can be distinguished based on visual characteristics.

The fact that the classic sociodemographic (and socioeconomic) variables have a less profound impact than sports-specific variables on (the purchase price of) sports apparel is in line with the conclusion of Scheerder, Vos and Taks (2011). This is probably due to the fact that variables such as sex and age indeed have an impact on whether one practices sports and on the sports activity that is chosen (as indicated in literature, for an overview see Breuer, Hallmann, & Wicker, 2011, and Thibaut, Vos, & Scheerder, 2014), while this influence diminishes once they have chosen for a specific sports activity (i.e. running). For example, Table 9.1 clearly demonstrates that the majority of the event runners are men, but once the hurdle to participate is taken, gender is no distinctive factor anymore. Instead, observational characteristics can be used in segmenting a specific group of sports participants, in this case, event runners.

The observational characteristics provide a tool to distinguish different types of running consumers. It is believed that by using certain sports goods, event runners consciously and/or subconsciously express how they think and feel about running, and more particularly the reasons why they participate in running (Bourdieu, 1979; Downward, 2004; Scheerder, Vos, & Taks, 2011; Veblen, 1925). For example, runners who wore an event-T-shirt were found to have a lower purchase price of sports apparel. Interestingly, this is especially the case for FW and ALL (and not for CLOTH), indicating that the significant differences should not be attributed to direct effects (free t-shirts are of course cheaper than buying clothing in stores). Based on these results, it is believed that information about their running AIO's and related sports apparel consumption can be deduced. A possible explanation could be that these runners take part because of they want to express that they are proud to take part in a running event, and that they belong to the event running community. On the other hand, it seems that the more performance-driven runners can be segmented based on running-specific clothing and activity-trackers (e.g. tight pants, sports watch/HR-monitor, smartphone band). Finally, it is also interesting for enterprises (and for government) that the bivariate statistics demonstrate that the different technological fitness-trackers (smartphone, in-ear headphone, HR monitor) can be seen as economic substitutes for each other.

The current study clearly demonstrates that observational data have their advantages. First, there is almost no non-response as most characteristics could easily be deducted from the pictures. Although a survey response rate of 36 percent is rather high, the 339 respondents are far less than the 945 event runners of which a picture was taken. By combining the regression results of the 339 survey respondents of with the observational characteristics of the 606 event runners who did not answer the questionnaire, the 'missing subjects' can still be incorporated by extrapolation. Second, analyzing pictures of the event runners does not take any time of the respondents, in contrast to completing a survey. Third, observation corrects for issues like recall bias (which apparel did I use during the events?), over- or underreporting because of social desirability (I want to pretend that I did use an HR-monitor, although I did not), etc.

Of course, these problems do occur (although less extensively) when the data are combined with survey data, as was done in the current research.

Despite the advantages of observation, the method also has a number of drawbacks. First, technical issues should be evaluated when taking pictures. For example, weather conditions are essential in achieving satisfactory results. Pictures taken with frontal sun should be avoided, while rainy conditions make it hard for the photographer to make satisfactory photographs. Also, pictures should be taken at the end of the race where runners are more dispersed, and it is advised to use at least two cameras (frontal and back). Second, in this study the visual scanning of the running pictures is done manually, which makes it a more time-invasive data gathering method for the researchers than is the case for surveys. Nevertheless, there is no doubt that in the future tools will be at hand to automatically scan pictures (Borji & Itti, 2014). For example, Facebook and Google (e.g. Google Photos) are developing software that automatically recognizes objects and faces in pictures. The latter brings us to a last, but important, issue. Although analyzing big data might provide a solution to a lot of social behavior challenges (e.g. obesities, energy, environment), today's accessibility to the data could (or should?) change in the (near) future due to opposition of citizens. Indeed, privacy is an important issue that should be kept in mind (Keller, Koonin, & Shipp, 2014), especially because of the increasing rate at which the financial and commercial sector are extracting (commercial) value from big data (Keller, Koonin, & Shipp, 2014; Xu, Wang, & Stavrou, 2015). Today, most (private) running events add a checkbox to the inscription form by which they ask permission to use the personal data, and to take pictures. This method is rather effective as (in line with social media applications) the default option to share broadly (Boyd & Hargittai, 2010). Another similarity with social media is the 'one-size fit all', as sports event organizers ask the participants for permission to take pictures and to use their personal data, or not (Damen & Zannone, 2014). If the participants do not agree with the preset conditions, they have no possibility to obtain their picture after the race and to consult their race result/finish time.

7. Conclusion

The results demonstrate that observational data contribute significantly in explaining the purchase price of sports apparel worn by event runners. Therefore it is remarkable that observation is not often used in in socioeconomic sports research (see also McKenzie, 2002). Both the bivariate statistics and the regression results demonstrate that event runners who were observed wearing an event-T-shirt, used less expensive sports apparel (footwear, HR-monitor, clothing). This can be interpreted as people expressing the way they think and feel about running and how they practice and consume the sports activity running (e.g. Downward, 2004; Scheerder, Vos, & Taks, 2011), by wearing certain sports goods.

Nevertheless, it is important to stress that we do not pone that observation can replace all survey research, as it is almost impossible to deduct AIO's, or other latent variables based on observation. Although, because of its unobtrusiveness, no nonresponse and objective data, we believe that the observation method can be of particular importance for the commercial sector and for sports consumers. Not only are the descriptive results very relevant to sports enterprises, but also the regression results can be used in identifying consumer profiles for segmentation purposes. For example, sports watch selling companies should focus on smartphone users, as they might be persuaded to buy the (more expensive) substitute HR-monitors. Sports apparel sellers should also differentiate between event participants for fun and excitement versus runners that aim to gain specific times or results. Second, the current study

provides an interesting method to analyze the consumer profile of different kinds of sports apparel. By extrapolating the results to runners that were observed participating in the running event but who have not answered the questionnaire, sports enterprises could make an estimation of the sports apparel they are possibly interested in. In this matter it is not the question if automatic picture analysis for objects will be at hand in the future, but when this will happen (Borji & Itti, 2014), making observation a more time- and cost-effective tool. Observation of sports participants will be of particular use for commercial sports apparel providers. For individual event runners, it is, therefore, essential to consider the privacy implications, as today almost all event organizers possess pictures of the participants at their running event.

From a research point of perspective, our suggestion is to explore the observation method in different settings because observational characteristics contribute in explaining sports participation behavior. Where in this research the focus was on the purchase price of sports apparel, other research purposes can be thought of, such as the link between observational characteristics and sports intensity variables (number of training sessions, number of running events), the kind of sports apparel that they prefer, their AIOs towards running, etc.

An important shortcoming of the current study is that it is not possible to extrapolate the results to other countries, or to other running events. Therefore, this study needs to be replicated in different settings, such as different running events and countries, but also in other sports (e.g. cycling events). The relatively small sample size of the survey (N=339) is a second drawback. This is because the dependent variable stems from the survey data (and not from the observational data) implying that it is hard to find significant differences with certain rare characteristics as the independent variables. For running belt and headwear for example relatively large although not significant differences can be found in Table 9.2, possibly due to the fact only a small part of the runners used these sports apparel.

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CHAPTER 10
Running Apparel Consumption Explained: A Diary Approach (Paper 7)

This chapter is submitted as a paper to an international peer-reviewed journal

Thibaut, E., Vos, S., & Scheerder, J. (2016). Running apparel consumption explained: A diary approach.

1. Abstract

First, the current study aims to identify the determining factors of the purchase price of sportswear worn by runners. Second, this study aims to demonstrate that diary methods can be a useful method in sports consumption research as they provide in a large amount of data on a very detailed, non-aggregated level. Based on a dataset of 2,235 running sessions of 192 runners, the results indicate that one fifth of the total variation is due to variation between running sessions of the same runner, instead of variation between runners. It is found that a runner wears a more expensive outfit at a running event session when compared to a training session. Runners with a higher educational level, income and who run in a fitness centre or a health club wear more expensive sports apparel than other runners. Both the regression results and the innovative diary approach bear interesting implications for runners, running enterprises and researchers. For example, implementing running consumption in smartphone tracking applications could improve the running experience, which on their turn provides in big data for further research.

2. Introduction

Running is a sporting activity that contributes significantly in Western citizens' health and well-being (Shipway, and Jones 2007). In recent decades running has evolved to one of the most practiced sports in Western society (Borgers, Vos, and Scheerder 2015), while figures indicate that overall sports participation is stagnating (Kokolakakis, Fernando Lera-López, and Panagouleas, 2011). In the United States 64 million people participated in running in 2014 (Running USA 2016; Statistica 2015), while in the EU-28 the number of runners is estimated at 50 million (Breedveld, Scheerder, and Borgers 2015). This large amount of running participants is an interesting target population for government, running apparel manufacturers/retailers, and event organizers. In the EU-28 for example, runners spend an average of 192 euros annually, resulting in a market of nearly 10 billion euros (Breedveld, Scheerder, and Borgers 2015). In order to maximise the economic profit and welfare for respectively the running enterprises and runners, one needs to understand the influencing factors of running expenditure. The first aim of the current study is therefore to identify the influencing factors of running expenditure, as little research is found that focuses on the determinants of running consumption.

While research on the determinants of running expenditure is scarce, numerous studies can be found that focus on overall sports expenditure. All these sports consumption studies use retrospective surveys to map sports expenses, which is not surprisingly since retrospective surveys are an efficient method to

gather data of large population samples (Bolger, Davis, and Rafaeli 2003). Nevertheless, surveys also imply a number of methodological disadvantages, such as the researchers' dependence on the respondents' willingness to fill out the questionnaires, and their ability to recall the requested data correctly. Also, while surveys typically provide in data of a large number of participants, a disadvantage is that the answers are clustered, implicating that survey-based studies usually investigate sociodemographic and socioeconomic variables on a rather aggregated level. The current study therefore suggests an alternative electronic diary approach combined with a running apparel inventory, generating panel data, as a complementary and/or alternative method to analyse running expenditure. Therefore, the second aim of this study is to evaluate the potential of diaries as a research method in the field of sports consumption, and its potential advantages and disadvantages.

Because a diary method is used instead of a survey, it is possible to analyse running consumption on a much more non-aggregated level when compared to other studies, which is the third research aim of the current study. More particularly, a comparison will be made of the running apparel worn by different runners at different running sessions during a sampling period of one month. It will be investigated whether runners use more expensive sports apparel depending on background characteristics that are mostly surveyed on a clustered level, such as the setting (with friends, alone, in a club, etc.) in which a running session takes place, the fact whether the running session is a training or an event, the intensity and the time that is spent on a specific session. Accordingly, the data allow for comparison of the within-runner-variability in the purchase price of their running apparel versus the between-runners-variability. In this matter it is noteworthy that orthodox economic theory (e.g. Becker, 1965) assumes that economic agents act rational and that their preferences are given. One would thus expect that runners' sports apparel usage only varies with certain sports-specific background variables. Given that this study compares the within-person variability and the between-person variability, the current study can provide in further evidence about the validity of the orthodox economic assumptions in a sports participation context.

3. Literature overview

3.1. The determinants of sports (running) consumption

The influence of sociodemographic, socioeconomic and sports-specific variables on sports expenditure has been investigated in numerous sports consumption studies. It is found that male (Lera-López and Rapún-Gárate 2005, 2007; Scheerder, Vos, and Taks 2011), educated (Lera-López and Rapún-Gárate 2005, 2007; Scheerder, Vos, and Taks 2011; Thibaut, Vos, and Scheerder 2014) citizens with a job and a higher income (Lera-López and Rapún-Gárate 2005, 2007; Thibaut, Vos, and Scheerder 2014) spend more money on overall sports participation, while for age mixed results are found (Lera-López and Rapún-Gárate 2005; 2007; Scheerder, Vos, and Taks 2011). When the focus is on expenditure on a specific sports activity, it can be noticed that apart from the positive influence of income (Hallmann and Wicker 2015 for golf; Wicker, Breuer, and Pawlowski 2010 for athletics; Wicker, Hallmann, and Zhang 2012 for running event expenditure; Wicker, Prinz, and Weimar 2013 for triathlon) less differences are found for the sociodemographic and socioeconomic variables gender (Hallmann and Wicker 2015 for golf; Wicker, Breuer, and Pawlowski 2010 for athletics; Wicker, Prinz, and Weimar 2013 for triathlon) and education (Hallmann and Wicker 2015 for golf; Wicker, Prinz, and Weimar 2013 for triathlon). Moreover, for some variables the relationship was opposite to expectations, such as the negative

influence of education on consuming athletics (Wicker, Breuer, and Pawlowski 2010) and cycling (Thibaut et al. 2016). On the one hand, these differences can be attributed to the specific sports activity. On the other hand one should also take in mind that – in contrast to expenditure studies on overall sports participation – the sports-specific studies on triathletes, athletes and golfers incorporate only people who have already chosen to participate. Indeed, research (e.g., Thibaut, Vos, and Scheerder 2014) demonstrates that determinants could have a different influence on the decision to spend money on sports versus on the amount of money that is spent.

For the sports-specific variables, people who engage at a higher level (higher frequency, duration, performance, etc.) are found to be bigger spenders (Lera-López and Rapún-Gárate 2007; Scheerder, Vos, and Taks 2011; Thibaut et al. 2016; Thibaut, Vos, and Scheerder 2014; Wicker, Breuer, and Pawlowski 2010; Wicker, Prinz, and Weimar 2013). Thibaut, Vos and Scheerder (2014) demonstrate that sports club membership positively influences overall family expenditure on sports, while Wicker, Prinz and Weimar (2013) and Thibaut et al. (2016) found no significance for the specific case of triathlon and cycling respectively. Scheerder, Vos and Taks (2011) also stress the importance of the social context, as people with sports active friends spend more money.

The above studies have focused on variables that vary from one sports participant to another. An interesting aspect of diary data, is that they allow for dividing the overall effect into a between-person and a within-person (between-running-moment) effect. While the sociodemographic (e.g., sex, age) and socioeconomic factors (e.g., income) are constant within the same person (i.e. between-person variables), the sports-specific variables (e.g., time spent on a running session, taking part in a running event) not only vary over different runners, but also between running moments of the same runner (i.e. within-person variables). The amount of within-person versus between-person variability can thus be investigated (Bolger, Davies, and Rafaeli 2003). On the one hand orthodox theory (e.g., household production theory of Becker 1965) assumes people to act rational based on limited resources such as time and income, while assuming preferences not to change over time (Stigler and Becker 1977). On the other hand, a significant part of the variation in sports expenditure should be attributed to other factors than – the relative stable variables – income and prices (Késenne and Butzen, 1987). The heterodox economic approaches challenge the orthodox economic theory and their assumption of stable preferences, and assume that other processes and variables influence sports consumption behaviour to a bigger extent than is the case in orthodox theory (Downward, and Riordan 2007). As the current study also investigates the within-person (and not only the between-person) variability, the data allow for checking whether the orthodox assumption of stable preferences holds or not. More particularly, based on the sports-specific variables it is investigated whether runners use different goods depending on the circumstances (background variables). According to the heterodox economic theory, within-person variability can be expected, while this variance is supposed to vary depending on social status (Bourdieu 1984) and other non-rational factors.

Although no studies on the (determining factors of) within-person variability in sports consumption are found, the above-mentioned studies can be used to formulate expectations about these variables. In line with the positive relationship between time and money that is spent on sports (Scheerder, Vos, and Taks 2011; Thibaut et al. 2016; Wicker, Breuer, and Pawlowski 2010; Wicker, Prinz, and Weimar 2013), it can be expected that when a person goes for a longer run, he or she will wear a more expensive outfit. The same goes for the training intensity, a variable that now can be investigated at a much more

disaggregated level. Heterodox theory also suggests that runners who train with significant others (e.g., friends, colleagues) or take part at a running event will opt for more fashionable and thus expensive clothing, because they want to express their running identity (Thibaut et al. 2016; Veblen 1925; Wicker, Hallmann, and Zhang 2012). It is also interesting to investigate whether runners wear more expensive clothing at running events or not, because numerous studies (e.g., Wicker, Hallmann, and Zhang 2012) survey runners at running events. The results of the current study can therefore also provide information whether running event consumption can be considered as a reliable (representative) snapshot of their overall purchase behaviour.

3.2. Data collection: survey, diary, inventory

As stipulated in the introduction, the second aim of the current study is to investigate whether a diary method can be used instead of a retrospective survey to gather sports consumption data. Therefore, this section gives an overview of the reasons why it could be interesting to use a diary method, while also considering the potential pitfalls. In literature it is clear that the majority of the socioeconomic sports studies uses surveys to gather retrospective consumption data (e.g., Eakins 2016; Hallmann and Wicker 2015; Lera-López and Rapún-Gárate 2005; Pawlowski and Breuer 2012; Scheerder, Vos, and Taks 2011; Thibaut, Vos, and Scheerder 2014; Thibaut et al. 2016; Wicker, Breuer, and Pawlowski 2010). Recall bias resulting from memory decay is one of the main drawbacks of retrospective studies. This especially holds when the requested reference period is extensive, and/or when the questions relate to detailed information that is hard to recall (Bolger, Davies, and Rafaeli 2003; Breen, Bull, and Walo 2001; Goossens et al. 2000). Recall bias is thus certainly applicable to sports expenditure survey research, as the reference period in most sports consumption studies is twelve months (Hallmann and Wicker 2015; Lera-López and Rapún-Gárate 2005; 2007; Thibaut, Vos, and Scheerder 2014; Thibaut et al. 2016; Wicker, Breuer, and Pawlowski 2010; Wicker, Prinz, and Weimar 2013), or even multiple years in the study of Scheerder, Vos and Taks (2011). Instead of asking directly for total expenditure, most sports consumption studies split total sports expenditure into a number of different expenditure categories, by which they aim to support the respondents in recalling all their sports expenses (Wicker, Prinz, and Weimar 2013). A second shortcoming of retrospective data gathering methods is that they often result in highly aggregated expenditure data (Pawlowski and Breuer 2011), and that it is almost impossible to link the usage of certain sports goods (e.g., hearth rate monitor, certain type of shoes or clothing) with certain background characteristics (e.g., taking part in a race/event).

Diary methods can be used to correct for the above-mentioned drawbacks of retrospective surveys. Diaries are found useful in obtaining within-person change over time, while also correcting for the biases of retrospection and measurement error (Bolger, Davies, and Rafaeli 2003; Breen, Bull, and Walo 2001). Bolger, Davies and Rafaeli (2003) highlight that the amount of within-person variability over time should be investigated to determine whether the usage of retrospective studies is appropriate. If the within-subject variability is small relative to the between-subject variability, one can conclude that retrospective research is (also) applicable, given the high effort/cost of diary research. Problems that arise with the diary method are the labour intensiveness for the respondent (Hodur and Leistritz 2006) and the potential research-participation-effect on the behaviour of the respondent (Bolger, Davies, and Rafaeli 2003). In socioeconomic sports studies diary methods are used to investigate household expenditure on consumables (e.g., Eakins 2016; Zhen et al. 2009), and consumption on sports travel and sports events (e.g., Breen, Bull, and Walo 2001). Though, diaries are less suited for mapping expenses

on durable goods because they are purchased infrequently (Goossens et al. 2000; Humphreys and Ruseski 2009), thereby generating a large number of non-genuine zeros. The sports expenditure studies that are based on diary-data normally use national expenditure data that are gathered to calculate the consumer price index (Eakins 2016; Løyland and Ringstad 2009; Pawlowski and Breuer 2012). The normal procedure in these studies is to collect panel data (expenditure data of similar families in subsequent periods), thereby correcting for the infrequency of purchase.

A last important remark is that almost every sports consumption study focuses on money expenditure (Eakins 2016; Lera-López and Rapún-Gárate 2005; Thibaut, Vos, and Scheerder 2014; Wicker, Breuer, and Pawlowski 2010), however, buying a good is not necessarily the same as consuming it. First, sports participants may spend money on items, but not use them (Scheerder, Vos, and Taks 2011). Second, a significant part of the sports participants uses sports goods that were bought before the reference period of the survey. A solution could be to ask the respondents to make an inventory of their sports apparel and to estimate the cost of all the sport apparel that they possessed, which is in line with the data collection method used in the study of Scheerder, Vos and Taks (2011). Based on the shortcomings of retrospective survey data collection methods, the current study investigates whether combining both an inventory and diary method provides in complementary and/or supplementary data. The combination of the inventory method with the diary approach makes it possible to investigate the running apparel determinants' influence on a very detailed and disaggregated level, which is in line with the suggestions of Pawlowski and Breuer (2011).

4. Method

In 2014, runners were contacted through running clubs, running communities, internet and Facebook running groups, etc. They were asked to complete an online sports apparel inventory combined with a 30-day-diary. In the inventory, runners fill out the goods that they had used for practicing their sport during the past year. The respondents had to categorise each of their running goods into one out of fifty sports apparel categories, ranging from different types of clothing (e.g., short stretch pants, looser-fitting short pants, t-shirt with short sleeves, socks), shoes (e.g., distance running shoes, spikes), technology (e.g., hearth rate monitor, MP3-player, GPS) and other wearables (e.g., braces, lights). Per sports good, the runners were asked to identify the brand, the year and price of purchase. In total, the running apparel inventory of 219 runners was gathered. The respondents were also asked about a number of sociodemographic, socioeconomic and sports-specific background characteristics, such as sex, age, education, job status, income and club membership (Table 10.1). Because the data was collected in four different quarters of 2014, the variable PHASE was added as a control variable. In the following, the above-mentioned variables will be categorised as 'between-person variables'.

In the second stage, the diary, the same runners were asked to fill out an online diary for a 30-day period. Each day they had to indicate whether they went for a run, or not. If yes, further questions were asked about the date, whether it was a training or a race/event, the duration in minutes, the intensity level, the setting (club, fitness, friends, etc.), and finally the sports apparel that they used. With respect to the latter, a digital wardrobe was presented to the runners containing all the goods that they had fill out in the first part (inventory). This resulted in within-person characteristics of 2,132 running moments. Because the diary characteristics vary within the same person, they are referred to as 'within-person variables' (Table 10.1).

TABLE 10.1
Abbreviation, definition and operationalisation of the dependent and independent variables

	Abbreviation	Definition	Operationalisation
Dependent Variable	TOT_VAL	Total purchase price of the sports apparel worn by the runner	Continuous variable in Euros (€)
Within-person variables	TIME	Time spent on running moment	Continuous variable in minutes
	INTENS	The (subjective) intensity at which the running moment took place	Ordinal: Recuperation Training (1) – Interval Training (4)
	EVENT	The running moment took place in an event/race	Dichotomous: Yes (1) – No (0)
	SETTING	Setting in which the running moment took place	Consists of five dichotomous variables: the setting *alone* (SET_ALONE), in a running *club* (SET_CLUB), in a *fitness center* (SET_FITN), with *friends/colleagues* (SET_FRIENDS), or in *other* less frequently used contexts such as with family (SET_OTHER)
Between-person variables	SEX	Sex of the runner	Dichotomous: Man(1) – Women(2)
	AGE	Age of the runner	Consists of three dichotomous variables: <41y (AGE_1), 41y-55y (AGE_2), >55y (AGE_3)
	EDUC	Educational level	Dichotomous: 1 (maximum high school degree) – 2 (university of college degree)
	JOB	In labour force	Dichotomous: Yes (1) – No (0)
	INCOME	Family income	Continuous variable in Euros (€)
	CLUB	Running club membership	Dichotomous: Yes (1) – No (0)
	PHASE	Quarter of the year	Q1 (January till March), Q2 (April till June), Q3 (July till September), Q4 (October till December)

The dependent variable of the current study is calculated by combining the two datasets, as in the diary method the runners stipulated the sports apparel that they had used at each running moment, while in the inventory the purchase price of each sports product is given. By merging the diary and inventory method, this study aims to avoid the main pitfalls of both retrospective (and diary) studies. First, infrequency of purchase was tackled by focusing on the running apparel inventory of the respondents, as runners were asked to take stock of all the running apparel they possessed and had used during the last year. Second, by including an extensive list of sports apparel categories (different types of clothing, shoes, hart rate monitors, etc.) the runners were assisted in recalling all their running apparel without overlooking any sports goods. Third, the diary method was used to collect running-specific data, but also the sports clothing, shoes and goods (and its purchase price, see also Scheerder, Vos, and Taks 2011) that they had used for each training moment.

The descriptive results of the dependent and independent variables are presented in Table 10.2. The descriptive statistics are based on the subjects for which all variables are given, resulting in a total number of 2,235 running moments of 192 runners. When compared with a representative survey about the sports participation habits of Flemish inhabitants, it is noticed that there is an overrepresentation of male, older, sports club members, who have a university or college degree, while their average household income is more or less the same (Scheerder, Borgers, and Willem 2015). The major reason of the non-representativeness of the dataset is probably due the labour intensiveness of filling out an extensive inventory and keeping up a diary for 30 days. More dedicated runners for which running is an important aspect of their lifestyle can be expected to be more prepared to take part in this study compared to non-dedicated running participants. A second explanation is that it was easier to access intensive runners, as they are predominate in the channels that have been used (e.g., sports clubs, informal running groups, internet forums) to contact potential research participants.

Analyses have been carried out in Stata 12, by means of the *xtreg* command with the fixed effects (*fe*) and between effects (*be*) options for respectively the within-person and the between-person variability. The fe-option investigates the time-series information in the data, meaning that it gives information about the effect of the independent variables on the dependent variable TOT_PRICE when the independent variables change within the runners. The be-option investigates the cross-sectional information in the data, i.e. the effect of the independent variables on TOT_PRICE when the former change between the runners.

TABLE 10.2
Descriptive Statistics of de Dependent and Independent Variables between the Training Sessions (Within-Person Variables) and between Different Persons (Between-Person Variables)

Variables	Mean and Standard Deviation (SD) for continuous and ordinal variables Frequencies for nominal variables
Dependent (*N*=2235)	
TOT_VAL	301.6 (SD=195.3)
Within-Person (*N*=2235)	
TIME	65.1 (SD=31.0)
INTENS	2.24 (SD=0.8)
EVENT	Yes (7.3%) – No (92.7%)
SETTING	SET_ALONE (13.2%) – SET_CLUB (66.7%) – SET_FITN (7.4%) – SET_FRIENDS (8.1%) – SET_OTHER (4.3%)
Between-Person (*N*=192)	
SEX	Man (63.0%) – Women (37.0%)
AGE	<41y (36.5%) – 41y-55y (44.8%) – >55y (17.7%)
EDUC	Maximum high school degree (28.1%) – University of college degree (71.9%)
JOB	Yes (86.5%) – No (13.5%)
INCOME	3543.5 (SD=1979.3)
CLUB	Yes (74.0%) – No (26.0%)
PHASE	Q1 (29.2%) – Q2 (16.7%) – Q3 (20.3%) – Q4 (33.9%)

5. Results and discussion

The figures indicate that 79 percent of the variability is explained by between-person variance. In other words, the value of the runners' outfit differs more between different runners, than that the same runner choses for an outfit with varying purchase prices. The above results clearly indicate that most of the variation in the sports apparel purchase price is situated between different runners, and not between different running sessions within the same runner. The fact that one fifth of the variance is attributed between distinct running moments (within-runners) is nevertheless notable, especially given that a significant part of the runners owns a limited amount of certain sports goods (e.g., running shoes), which has a negative impact on the within-person variability. This implies that one needs to be careful with extrapolating sports consumption based on one running moment, and instead take a number of running sessions or a specific time-period into account.

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The regression results in Table 10.3 are thus divided in two parts. First, the coefficients of the within-person variability are given, which is only possible for the variables that vary between different running sessions. In the second column of the table the influencing factors of the between-person variability are explained, both for the within-person variables and the between-person variables. In other words: the within-person variables vary both between running sessions (within-person), and between different individuals (between-person), while the between-person variables only vary between different individuals (between-person). The specific regression results not only give insight in the determining factors of running consumption, but also in the stability of the runners' preferences.

Applied to the specific case EVENT, the results demonstrate that runners wear more expensive outfits at running events, while no effect is found in the between-person variability. This finding implies that the effect of EVENT is not due to the fact that event runners are more dedicated runners. Indeed, when a runner takes part in a running event, he or she wears more expensive sports apparel than when the same runner is active in other running sessions. The latter can be explained by the effect of the runners' desire to express their running identity towards spectators and peer runners by dressing up with their most fancy clothing (e.g., Thibaut et al. 2016; Wicker, Hallmann, and Zhang 2012). An alternative explanation could be that runners believe that their best and thus most expensive running apparel will help them in achieving a specific time or place. Given the focus of the current study on the sports apparel purchase price and the positive effect of EVENT, it can be assumed that also studies on event runners' expenditure (e.g., Wicker, Hallmann, and Zhang 2012) should not be extrapolated to their normal consumption pattern.

For the variables TIME, INTENS and SETTING, no differences were found in the within-person regression. When looking at the between-person results, people who run in a fitness centrum (SET_FITN) wear more expensive clothing. Nevertheless, no significant effect was found on the within-person variability. This means that runners who go for a run in a fitness center, wear more expensive clothing compared to people who did not run in a fitness centre in the reference period (one month). Again, it can be argued that these results fit the heterodox economic theory. Indeed, fitness centres can be seen as an ideal place for runners who want to express their identity, and/or runners who aim to pursue the running lifestyle. It is not hard to imagine that these runners also prefer more expensive running brands, and the best technological assistance possible.

TABLE 10.3
Within-person and between-person regression results of runners' outfits purchase price

Independent Variables	Within-Person Regression	Between-Person Regression
TIME	0.04	0.99
INTENS	-0.80	-11.05
EVENT	20.75*	-33.35
SET_ALONE	-13.45	17.02
SET_FITN	-4.65	157.31*
SET_FRIENDS	-9.76	-44.10
SET_OTHER	-9.56	50.75
CLUB		37.09
SEX		31.87
AGE_1		-3.06
AGE_3		-9.05
EDUC		61.26*
JOB		68.00
INCOME		0.02**
Q1		6.51
Q2		-49.8
Q3		-54.87
_cons	302.78***	-28.23
Within-group variance	177.97	
Between-group variance	92.00	
Rho	0.79	

Note. *p<.05. **p<.01. ***p<.001.

A look at the between-person variables demonstrates that the outfits worn by higher income runners (INCOME) were purchased at a higher price, which is in line with orthodox and heterodox economic theory (Becker 1965; Bourdieu 1984) and with previous research (e.g., Lera-López and Rapún-Gárate 2005; 2007; Thibaut, Vos, and Scheerder 2014). Runners with a higher degree of education (EDUC) spend more money on their sport which contrasts with most previous studies that focus on expenditure on one sports activity (Hallmann and Wicker 2015 for golf; Wicker, Prinz, and Weimar 2013 for triathlon). For the other independent sociodemographic and socioeconomic between-person variables (SEX, AGE, JOB, Q1-Q3) no significant differences were found. These non-significant findings possibly reflect the literature findings that apart from income (and in this specific case also education) the socioeconomic and sociodemographic characteristics only influence the decision to take part in certain sports activities or not, and that these variables are less related with the level of consumption once a certain sports activity is chosen. As the focus in the current study is on runners, all the research subjects already took the decision to take part.

Regarding the second aim of this research, also interesting implications can be drawn concerning the data collection through diary methods. On the one hand, the above results demonstrate that a diary method is also a valid and useful data gathering method in the field of (sports) consumption. It results in non-aggregated data that are less subject to recall bias, thereby allowing for more detailed analyses. On the other hand, an important drawback of the data collection in the current study is its time-invasiveness for the respondents, making it hard for the researchers to persuade runners to take part in the study. Indeed, we noticed that, in order to prevent certain runners from dropping out, certain aspects

of the research design should be changed. First, the application is desktop-based and not available for smartphones, such that for some runners filling out the diary was labour intensive as they had to start their computer. Second, although the user interface was simple and functional, it was text-based and thus not really visually appealing (Baig, GholamHosseini, and Connolly 2015). The usage of pictures of the sports clothing/shoes/goods and touch-screen functionalities would improve the user-friendliness of diary applications. Third, and possibly most important, the respondents experienced little advantage of filling out the inventory and the diary. The diary application was designed for research purposes, and little additive information was given towards the respondents.

The former two problems can easily be taken into account for by computer programmers. Moreover, the above-suggested layout corrections are already at hand in the number of (free) running applications on mobile phones. These applications attain a large market of running consumers, offering big data about an extensive amount of running characteristics (Baig, GholamHosseini, and Connolly 2015; Boyd and Crawford 2012; Cortes et al. 2014). With regards to the third obstacle, it could be interesting to integrate a sports-apparel monitoring tool into these existing running applications. As applications have a significant and growing positive impact on our everyday lives (Baig, GholamHosseini, and Connolly 2015), this could also apply to sports apparel usage and consumption. Several running applications on mobile devices are connected to social media profiles and focus on the monitoring of running sessions, such that they already gather information that is similar to the majority of the independent variables that are used in the current study (Baig, GholamHosseini, and Connolly 2015). This could, for example, be done by incorporating a 'digital' wardrobe/closet in running applications. Running applications could thus provide the runners in information about their sports apparel usage, such that their purchase habits and sports apparel usage becomes more efficient. In the long run this could foster their running experience, and thereby facilitate their running participation. Especially for beginners it is not always easy to distinguish between essential and non-essential sports goods. In addition, it is not always easy for novice runners to understand the differences in functionalities (and prices) of certain sports clothes/shoes/goods, and thus often purchase sports apparel that is not adapted to their running needs.

Therefore, the interconnectivity between runners and their sports goods could turn out to be an interesting option to give them guidance in their sports apparel consumption, as an application of the concept 'internet-of-things' (Hiremath, Yang, and Mankodiya 2014). The comparison of running apparel usage by similar runners could for example provide information about which clothing, shoes and wearables their peer runners prefer. Also, these personal tastes and preferences can be combined with weather-data (e.g., temperature, rain) such that suggestions can be given about which clothing runners should pick out for a run. On their turn, the usage of this application by numerous numbers would make it possible for researchers to collect and sort information on a massive scale (Boyd and Crawford 2012).

A second drawback regarding diary data are potential privacy issues (Cortes et al. 2014). In the current study information about private characteristics such as income were surveyed, along with expenditure data. Boyd and Crawford (2012) stress that researchers should ask themselves about the ethics of their data collection, analysis and publication. While our goals where scientific, namely contributing in explaining consumer behaviour with regards to running consumption, it is not hard to imagine that the obtained data could be (mis)used for commercial purposes. Therefore, a key challenge of sports tracking

applications is to protect the consumers' privacy, not only by acting in line with ethical standards, but also by developing techniques to prevent data leakage (Cortes et al. 2014).

6. Conclusion

The current study focused on the influencing factors of running apparel consumption by using a diary data collection method. The results demonstrate that the purchase price of the outfit worn by runners not only varies between different persons, but that one fifth of the variation is explained by variation between different running sessions of the same runner. Regarding within-runner variations, it is found that runners wear a more expensive outfit when compared to their training sessions. This finding is relevant from an economic theory point of view, as it indicates that sports apparel usage differs within the same person. With respect to the between-person variation, runners with a higher educational level, income and who run on a treadmill in a fitness centre or a health club wear more expensive sports apparel.

The current study also clearly demonstrates that diary data can be used as an alternative for survey research. Although this data gathering method is labour intensive for both the researchers and the respondents, it results in detailed, disaggregated data. More particularly does this method makes it possible to investigate the determining factors of within-subject variation, a subject that has been neglected in most socioeconomic research.

A direct implication of the fact that runners wear a more expensive outfit at running events, is that running events are not a representative setting for running consumption. For researchers and sports enterprises, this is an important finding, as they need to be aware that runners at running events do not wear a representative outfit (clothing, shoes, goods) when compared to their training sessions. This finding also implies that running events are interesting occasions for running brands and stores to promote and/or sell their prime brands and sports goods. Also, high-premium brands and/or specialised gadgets should focus on runners with a higher income and a higher educational level, especially when they also practice their sport in fitness centres. Another implication is that it would be interesting to develop a monitoring tool for sports apparel consumption, or even better, to incorporate it into popular existing running applications. A key focus should be upgrading the user-friendliness of the diary application of the current study, and developing a tool that guides and supports runners in their sports apparel usage and consumption. Indeed, in line with the current running applications the sports consumption diary should focus on upgrading the running experience of its users. When more runners experience advantages of reporting their running consumption, more runners will use the application, resulting in more data for research purposes.

The major limitation in the current research is the non-representativeness of the dataset. Future research should aim to incorporate a higher amount of less-dedicated runners. The same goes for the research context of this study, i.e. Flanders, as it should be checked whether the influencing factors depend on the country and/or region where the study is conducted. A final drawback of the current study is the design of the 'application'. As already mentioned in the discussion, the current study was meant for research purposes, and the design of the user face of the diary is not user-friendly when compared with popular running applications.

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SECTION 5

DISCUSSION AND IMPLICATIONS

CHAPTER 11
Discussion and Implications

In the studies of Section 2, 3 and 4, the determining factors of sports expenditure were investigated from a socioeconomic point of view. As outlined in the introduction, sports-specific questionnaires and alternative data gathering methods (i.e. observation and diary) were designed to quantify the effect of classic socioeconomic variables and rarely investigated variables on both aggregated and non-aggregated (i.e. different sports activities and expenditure categories) sports expenditure. Specifically, the current doctoral thesis investigated the following research questions:

- What are the determining factors of spending money on sports participation? (RQ1)
    - To what extent do the different groups of sociodemographic, socioeconomic, sports-related and psychographic variables contribute to explaining sports expenditure?
    - Is it an added value to investigate separate sports activities and expenditure categories?
- To what extent is income a barrier in consuming sports? (RQ2)
    - Is the income-expenditure relationship significant, and is it a positive (full-income/pure-income) or a negative (substitution) one?
    - What is the magnitude of the income-expenditure relationship (income elasticities)?
- What are the drawbacks of survey research, and how can they be tackled? (RQ3)
    - Which corrections (survey design, zero-regression methods, etc.) can be applied to optimise survey-based research?
    - What is the potential added value of alternative data-collection methods (i.e. observation, diaries) in the field of sports consumption?

The next sections of this doctoral thesis summarise and elaborate on the three main research questions of the current doctoral thesis and provide implications for policy, the commercial and federated sector, and for further research.

1. Determining factors of sports expenditure (RQ1)

The aim of the following paragraphs is to paint a coherent picture of the wide range of regression results that are found in the different studies of this thesis, by wrapping up the results per determinant. It is demonstrated that a significant part of the incongruence between the regression results should often be attributed to differences in the methodology (e.g. one-part models such as Tobit versus the two-part regressions Heckman and hurdle) on the one hand, and in the research population (e.g. households versus individuals) on the other hand. Also, the following discussion of the numerous variables refers to the different papers by mentioning the chapters, while also taking the literature overview of Table 2.1 into account. In line with the papers of this doctoral thesis, this discussion also subdivides the determining factors into five categories, namely sociodemographic, socioeconomic, sports-related, psychographic and non-sports leisure variables (e.g. Scheerder, Vos & Taks, 2011; Wicker, Breuer & Pawlowski, 2010). Certain sociodemographic and socioeconomic variables such as sex, age, income and education

are investigated in almost every sports expenditure study, while this is less the case for the sports-specific, psychographic and non-sports leisure variables.

1.1. Variable groups

1.1.1. Sociodemographic variables

The sociodemographic variables are included in every study in the current doctoral thesis, and also in all regression-based studies in previous literature (see Table 2.1). In economic theory these variables are assumed to represent variations in the consumers' tastes (Gratton & Taylor, 2000: 53).

Men spend more money on sports than women (Chapter 5/9), which is in line with previous research (e.g. Eakins, 2016; Lera-López & Rapún-Gárate, 2005; 2007). Nevertheless, the variable gender is not a significant factor when only citizens who are in the workforce (Chapter 5) or runners (Chapter 9/10) are surveyed. This seems to suggest that gender is a good proxy variable to determine whether one is sports active or not, and to determine the sports activity that one prefers. Nevertheless, once a specific sports activity is chosen, gender is apparently of less importance for the money that is spent on that specific sports activity. These results are also in line with triathlon-specific expenditure research (Wicker, Prinz & Weimar, 2013) and with the finding that for most sports activities gender is no influencing factor for expenditure (Wicker et al., 2010). Also, because sports expenditure is of course related to sports participation, support for this argument can be found in Gratton and Taylor (2000: 54) who state that participation differences mainly occur because girls' exposure to sports during childhood is lower than for boys. Downward (2007) notices that men have a higher chance of taking part in overall sports participation and in most sports activities.

For *age* ambiguous results are found, which is in line with previous literature (Table 2.1). Overall, age seems to be a barrier to overall individual expenditure on sports (Chapter 5/7/9), although no significance is found for household expenditure (Chapter 4). A possible explanation for the latter is that the study only includes families with school-aged children, such that the oldest persons (parents) in that sample are not (yet) physically constrained. Stated differently, age is found to have a certain negative impact on sports expenditure, especially when also older adults are included. Nevertheless, for most sports activities (Chapter 7) and for running in specific (Chapter 10) no significance is found. Applied to the specific groups of event runners (Chapter 9) and swimmers (Chapter 7) this even results in a positive relationship. These findings again seem to suggest that age has only a negative effect on the decision to spend money or not, and that – once this decision is taken – older participants sometimes spend higher amounts of money on sports. The latter could explain why opposing age-expenditure relationships are found in previous studies.

From a heterodox, sociological point of view, social variables are also believed to be determining factors of sports consumption. The effect of the household composition on sports expenditure is studied through a number of variables. The bigger the *household size* is, the lower is the expenditure per family member (Chapter 4), which is in line with the literature findings that family size is negatively related to individual expenditure (Løyland & Ringstad, 2009; Scheerder et al., 2011). This seems logical, because household income normally does not rise proportionally with the number of family members, such that the same amount of money (i.e. income) has to be divided between more family members. Nevertheless, the negative effect of family size on overall household sports expenditure (as found in Chapter 6) and the

fact that the number of family members has no significant effect on individual expenditure (Chapter 5) contradicts with this conclusion. It is also remarkable that families with *parents* that were *sports active during their youth*, are found to be bigger spenders (Chapter 4). A possible explanation is that they experienced the advantages (fun, health, etc.) of sports, such that they spend more money for themselves and for their children. Other social variables such as *having a life partner* (Chapter 5/9) and the *number of parents* (Chapter 4) have no significant effect on sports expenditure.

Two possible explanations can be discovered for the contradiction between the finding that having a *child under 6 years* old negatively influences sports expenditure (Chapter 4) versus the non-significant effect of *having children* on cycling expenditure (Chapter 9). First, it is expected that cycling is a sports activity that can easily be practiced with the family. This also strokes with the finding that for swimming, more money is spent when the children are younger (Chapter 7). Second, this result is again in line with the hypothesis that certain variables have a bigger effect on the decision to spend money (i.e. both sports and non-sports participants in Chapter 4), versus the amount that is spent (i.e. only sports participants in Chapter 9).

A small negative influence of *urbanisation* on household expenditure is found (Chapter 4), while soccer is the only out of 13 sports activities for which a significant negative effect is obtained (Chapter 7). These findings confirm the negative relationship between urbanisation and expenses by German sports club members (Wicker et al., 2010), while they contrast with the non-significant results for people in Spain (Lera-López & Rapún-Gárate, 2005; 2007), and the positive effect for households in Ireland (Eakins, 2016). A possible explanation can be found in the research context and the governmental sports policy. Because in Flanders there is a relative high density in population and sports infrastructure, the research subjects do not have to travel large distances for practicing sports in general, and most specific sports activities in particular (Scheerder, Thibaut & Willem, 2015). Soccer apparently is an exception, possibly because in the city there are less grass fields and soccer clubs, and a bigger supply of alternative sports (facilities).

1.1.2. Socioeconomic variables

Income is unambiguously found to be an essential determining factor of sports expenditure, as it positively influences both the probability and the amount that is spent on sports, for households (Chapter 4) and individuals (Chapter 5/9), and this for almost every sports activity (Chapter 5/7/9/10). This is in line with previous literature, that also finds a consistent positive effect of income on sports expenditure (Table 2.1). Put differently, low income can be seen as an important barrier in sports consumption. Because of the importance of income in consuming sports, and because of the fact that the government intervenes through monetary stimuli, the income-expenditure effect is also studied by the calculation of income elasticities (Chapter 5/6/7) that have been summarised in the current Chapter 11, Paragraph 2.

Education has a positive impact on overall sports expenditure (Chapter 5/6/7). Nevertheless, this positive relationship only holds for the decision to spend money on sports or not, but not for the amount that is spent (Chapter 4). Moreover, there appears to be no significant effect when only labour-active citizens are taken into account (Chapter 5), and even a negative relationship between education and money expenditure by cyclists (Chapter 8) and event runners (Chapter 9) is obtained. These findings highlight that sports expenditure consists of two decisions, namely the decision to spend money on sports or not (and thus taking part in sports), and the amount that is spent. This argumentation could also

be an explanation why Wicker et al. (2010) find a negative relationship between education and expenditure by sports club members, as their research population consists only of sports (club) participants.

Time is also an important economic factor, as demonstrated by Késenne and Butzen (1987) and Taks, Renson and Vanreusel (1994). Nevertheless, no significance is found in the current thesis for *the percentage of a fulltime job* (Chapter 5), *the amount of household work* (Chapter 5), or *the perceived amount of free leisure time* (Chapter 5).

1.1.3. Sports-related variables

The fact that in the previous literature only a limited number of studies include sports-related intensity variables (e.g. Scheerder et al., 2010; Wicker et al., 2010) contrasts with the finding that these variables contribute significantly in explaining sports expenditure. The more time that someone practices sports, the more money that he or she spends. This is indicated by the positive effect of the *number of sports minutes* and the *sports frequency* on household (Chapter 4) and on individual (Chapter 5/8/9) expenditure. Other positive influencing factors are *sports club membership* (Chapter 4), and the *number of sports disciplines* (Chapter 5/8), both of which are in line with a spill-over effect between different kinds of sports activities (Downward, 2007). With respect to the latter, spending money on a specific sports activity (i.e. cycling and running) is not significantly influenced by *practicing other sports* (Chapter 8/9). This implies that once people have chosen for a specific sports activity, they consume this sport as an independent activity, regardless of other sports activities. The only sports-related variables that are insignificant, are the *context* (Chapter 8/9) and the *number of years of practice* (Chapter 8). Finally, it is demonstrated that the same person wears a more expensive outfit when he or she takes part in a *running event* than is the case in other organisational settings (Chapter 10).

1.1.4. Psychographic variables

The fourth category of characteristics describes the citizens' attitudes, interests and opinions (AIO's). On the one hand, the *identification* with a sports activity, and the behaviours *watching cycling on TV*, following a *training program*, *reading cycling books* and *consulting cycling websites* are all positively connected with cycling expenditure, while a negative relationship exists for cyclists' who score high on AIO's that could result in *quitting from cycling* (Chapter 8). For running it is found that certain behavioural characteristics such as wearing a *sports watch*, *tight clothing*, *running belt* and/or a *smartphone armband* are positively connected to sports expenses (Chapter 9). A possible explanation could be that the biggest spenders among the runners and cyclists (un)consciously express their dedication towards the sport that they practice, and/or to optimise their performance. The results indeed indicate that running event participants, by opting for these running-specific apparel, express that they make part of the informal running community, especially because for certain characteristics (e.g. running belt, tight clothing) it can be questioned whether they are performance-enhancing in a 5K/10K running event.

On the other hand, when a sports activity is practiced for its instrumental values, sports expenditure is found to be lower. People who take part in cycling for *health reasons* (Chapter 8) spend less money. We believe that the same reasoning goes for people for whom social arguments prevail. It is for example found that event runners who wear the *event t-shirt* (Chapter 9) have lower-valued sports apparel. It

seems probable that by wearing this T-shirt, the event runners express their interconnectedness with the event/running community.

1.1.5. Non-sport leisure variables

In addition to the above-listed variables, Chapter 5 also includes independent variables regarding the consumption of non-sport leisure activities. Only one significant effect is found in this matter, namely the positive relationship between sports expenditure and *membership of a socio-cultural organisation* (Chapter 5). Nevertheless, when only labour-active people are involved, also *watching television* (C5) and *attending cultural activities* (Chapter 5) intervene with sports expenditure. For *reading books* no significance at all is found (Chapter 5). In general, little spill-over effects are thus noticed regarding non-sports leisure activities.

1.2. Discussion

1.2.1. Aggregated sports expenditure

1.2.1.1. Orthodox economic theory

Neoclassical orthodox theory assumes that the (socio)economic variable wage rate significantly influences money expenditure on sports participation (e.g. Becker, 1965; 1976). As the wage rate is often operationalised through income (e.g. Downward & Rasciute, 2010; Hallmann & Breuer, 2014; Wicker, Breuer & Pawlowski, 2010), the studies in this doctoral thesis confirm a positive full-income/pure-income effect on sports expenditure. Because of this unambiguous positive income-expenditure relationship, more insight is needed in the essential role of income as a burden in consuming sports. Therefore, the magnitude of the income-expenditure relationship is researched by estimating income elasticities (Chapter 5/6/7), that will also be discussed in the current chapter (see Paragraph 2). Based on the findings in the different studies, it can be stated that the orthodox economic theory provides in an adequate theoretical framework for calculating changes in sports expenses in response to marginal changes in income (Eakins, 2016; Késenne & Butzen, 1987). This is relevant, because one of the main governmental policy tools is to hand over monetary subsidies to correct for these monetary restrictions (see also Paragraph 2).

The second factor that is presented in the neoclassical theories, is time availability (e.g. number of household tasks, percentage fulltime work, subjective amount of leisure time), for which less convincing evidence is found. Nevertheless, when looking only at the time that is spent on leisure, there are indications that consuming certain leisure activities (e.g. watching TV, attending cultural activities) intervenes with spending money on sports. The latter findings mostly apply to people who are in the labour force, thereby pleading in favour of a possible trade-off between earning labour-income, and the opportunity cost of time (e.g. Késenne & Butzen, 1987; Taks et al., 1994). Also the fact that the income elasticity values based on expenditure and on total household income tend to be a little higher than respectively the ones based on time (Chapter 7) and on personal labour-income (Chapter 5), is in line with the substitution effect as stipulated in the income-leisure trade off. Indeed, this means that primarily a full-income/pure-income effect is found, although the differences between these elasticities seem to suggest that also a (very) small substitution-effect exists. The latter strokes with the fact that Meltzer and Jena (2010) and Humphreys and Ruseski (2015) find indications that to a certain extent, a substitution effect exists regarding sports participation.

The third classic orthodox factor is education. It is expected that higher educated individuals have more human capital, that augments the efficiency of their sports consumption. Individuals with a higher education are for example found to have a higher probability of spending money on sports. A possible explanation could be that they better understand the advantages of sports participation, and therefore invest more in their physical/social/etc. health in the long run. The non-significant or even negative relationship between education and the amount that is spent on sports is more surprising and is in contrast with expectations. Nevertheless, one could also argue that this negative relationship reflects the fact that higher-educated individuals and households consume sports participation more efficiently, and maybe more for its instrumental value (see also Paragraph 1.4).

The above demonstrates that the focus of the neoclassical approach on prices and income is a useful framework for analysing their effect on sports consumption. In Chapter 4/5/6/7 the household production theory of Becker (1965) indeed proves its 'researchability' regarding the income-expenditure relationship, as it provides in a framework to predict and analyse the impact of income on sports expenditure. Stated differently, when the focus is on income and on marginal effects, the orthodox theory (i.e. Becker, 1965) provides in a clear framework to analyse *how big* the income-expenditure relationship is. The well-defined framework and assumptions of the household production theory make that clear mathematical answers can be provided on specific research questions, for example by the calculation of income elasticities. The latter can serve as guiding tools in evaluating monetary stimuli (sports subsidies) to citizens (see also Paragraph 2).

1.2.1.2. Heterodox economic theory

Although there are arguments in favour of orthodox economic theory, the data do not give strong support for time-effects, nor for a substitution effect away from time-intensive sports participation (see also Chapter 5/7). The fact that almost the same elasticity values are found when individual labour-earned income or overall (labour and non-labour) household income is used, also echoes that the substitution effect is very small. A possible explanation is that the orthodox model is (too much) a simplification of the reality, especially because it ascribes all variation to prices and income. It is thus interesting to broaden perspective and to also apply heterodox economic theory, which draws upon a wider range of social-scientific literature (psychology, sociology, etc.). Opposite to the orthodox theory, preferences are not considered endogenous, stable and the same across individuals, but they are assumed to depend on other factors such as the social environment, identities shaped by society, (irrational) feelings, etc. Variation in sports consumption is thus (also) attributed to other variables than income and prices. Despite these different point of views, it is difficult to empirically test whether the orthodox or heterodox theory should be applied, because heterodox theory assumes the same relationship between income, education and time as the orthodox theory (although for different reasons). Accordingly, the sociodemographic, sports-related and psychographic variables that are listed below are often also included in the orthodox theory as proxies for tastes.

Certain sociodemographic variables (e.g. sex) influence the sports expenditure decision in a clear direction, but for most other variables little evidence or contradictory results are found. Moreover, it appears that the sociodemographic variables are relative good proxy variables for the tastes of customers when analysing the discrete choice of spending money on sports or not, and to determine the sports activity that they should spend their money on. But, once a specific sports activity is chosen, the sociodemographic variables are often not capable in differentiating in the amount that is spent, which is

in line with the suggestions of Downward (2007) who investigated the probability to practice a sports activity or not. The findings of the current thesis thus provide in evidence that the role of certain sociodemographic variables in the sports consumption decision should be refined (e.g. Gratton & Taylor, 2000: 53).

The *sports-related* variables reflect the amount of sports participation that is consumed by sports participants, and the intensity at which the sports are practiced. Therefore, it should not surprise that these variables predict sports consumption rather well, a finding that is in line with previous research of Scheerder et al. (2011). Moreover, a number of these variables (e.g. distance that is run, speed, sports apparel that is used) can be observed in the behaviour of sports customers, as demonstrated by the observation study (Chapter 9). Because the latter proves that a part of these variables can be deduced based on 'objective' data instead of respondent-based, they are very relevant for segmentation purposes.

Although that empirically testing whether the orthodox or heterodox theory performs better is difficult, certain findings in the current doctoral thesis plead in favour of heterodox economic theory. Indeed, some results contrast with the orthodox assumption that economic agents take complete rational decisions based on a fixed set of tastes. Irrational behaviour with varying preferences was for example noticed among running event participants (e.g. wearing a running belt, event T-shirt) that has to stem from other motives than rational decisions. This sheds new light on the findings in the current thesis that the psychographic (AIO's) variables influence sports consumption to a larger extent than certain classic economic variables. As these variables describe how people feel about sports-related and non-sports-related subjects, it can be argued that they are more in line with non-rational behaviour. Finally, the positive effect of parents' sports participation during childhood on household sports expenditure also aligns more with heterodox arguments.

The above results demonstrate that the heterodox economic theory allows for investigating the relationship between sports consumption and other determining factors such as sports participation behaviour of significant others, feelings and thoughts (about sports participation), etc. Chapters 8/9/10 clearly demonstrate that certain heterodox variables contribute significantly in explaining sports expenditure. The heterodox theory gives insight in *why* certain people spend more or less money on sports. They are thus better suited than orthodox economic theory to provide the government in a policy rationale about other factors than income.

1.2.2. Non-aggregated sports expenditure

As the studies of the current doctoral thesis found significant differences when sports expenditure was disintegrated into smaller units, it can be concluded that more non-aggregated sports expenditure research is needed by means of sports-specific surveys. This decomposition can be situated on a number of different layers.

First, the regression results that are summarized in Paragraph 1.1 of the current Chapter 11 demonstrate that significant differences exist in the determining factors of various sports activities. Moreover, when investigating specific sports activities, the discriminating power of the classic sociodemographic and socioeconomic variables clearly diminishes, implicating that segmentation should be based on other – often heterodox – variables.

Second, Chapter 6 and Chapter 9 show deferring results in the determining factors of different sports expenditure categories. The only variable that influences sports expenditure for all 12 expenditure categories is *income* (Chapter 6). For *age* the results are less clear, as it is positively related to the decision to spend money on transport, while no significant results were obtained for the other 11 expenditure categories. The variable number of *family members* even resulted in opposite significant effects, as it has a negative effect on overall sports expenditure, but a positive effect on sports club membership, sports camps, equipment and clothing.

Third, the decision to spend money on sports is often determined by other variables than is the case for the amount that is spent. Education is a prime example, as it positively influences the decision to spend money on sports, but has little or even a negative effect on the amount that is spent.

2. Income (RQ2)

The Paragraph 1.1.2 clearly demonstrated that for all studies a positive effect of income on sports expenditure is found. Therefore, the Chapters 5/6/7 estimate the magnitude of the income-expenditure relationship by the calculation of income elasticities. These results are of particular importance for the government, as monetary scarcity is an issue that government can relatively easily correct for, e.g. by increasing subsidies (see also Paragraph 4 for the policy implications).

First, the figures in Chapter 5 indicate that, regarding the probability of spending money on sports, lower-income citizens benefit more from a percent rise in income than is the case for higher-income economic agents. On the contrary, the income-elasticity values of the amount of money that is spent (only for the people that spend money) are higher for high-income citizens, although both to a lesser extent.

Second, large differences exist between the elasticity values of the expenditure categories, as ‘core’ sports products and services tend to have lower elasticity values (e.g. footwear, equipment, clothing, sports events, membership fees, sports camps), when compared to additional non-essential expenditure categories that have a more ‘luxury’ status (e.g. sports holiday, transport by car, sports food and drink, additional sports lessons).

Third, elasticity values also differ between different sports activities. Certain relative expensive (e.g. tennis, winter sports) and time-efficient (e.g. running) sports have higher income elasticities than cheaper and/or time-intensive activities (e.g. walking, martial arts, cycling, swimming).

Finally, certain (small) differences exist between the determining factors of the income-time and the income-expenditure elasticities (Chapter 7). Nevertheless, although the results demonstrate that it is better to investigate the time and money that is spent on sports separately, the overall parallels in the results indicate that both dependent variables are relatively good proxies for one another. Consequently, time and money expenditure prove to be closely connected, as suggested in the theoretical flowchart of the sports consumption decision in Figure 2.1.

All of the above findings bear relevant policy implications, as the government should use these results in optimising its policy actions (i.e. subsidies, sports supply). Nevertheless, the results also demonstrate that – despite the interesting insights from the relative comparisons of the income elasticities – it is difficult to draw hard conclusions based on the absolute elasticity values. The results of Chapter 6 for

example indicate that sports expenditure is a luxury good (ε >1), while, based on the same dataset, Chapter 5 and Chapter 7 consider sports consumption as a normal good (ε <1). In line with the findings of Pawlowski and Breuer (2012), this difference should be attributed to the regression method that is used, namely the log normal hurdle model for the former and the Tobit model for the latter. Overall, income has a positive influence on total expenditure on sports, and all studies demonstrate that the magnitude of this relationship (income elasticity) is close to one.

3. Survey, diary and observation (RQ3)

In the third research question the focus is on the advantages and disadvantages of the survey methods, and how researchers could correct for them. The studies in Chapter 9 and 10 demonstrate that *observation* and *diary* methods provide in additional information that is complementary to survey-based research. The major advantages of observation are its unobtrusiveness towards the research object and the fact that 'objective' behaviour is taken into account, while for diaries the very detailed and disaggregated data make that new research questions can be investigated. Moreover, in the near future technological progress will probably foster the data-gathering process through observation and diaries, respectively because of evolutions in automatic picture analysation technology and the emerging possibilities of smartphone tracking applications. Therefore, our answer to the question posed by Annear, Cushman, Gidlow, Keeling, Wilkinson and Hopkins (2014) is that visual research methods should indeed have a prominent place in the field of leisure studies, but that this should also be the case for diary methods.

Despite the promising findings based on observation and diaries, and the rapid technological evolutions, surveys remain the prime source of data. The advantage of survey research is that it is relatively convenient and time-efficient to gather data about all possible background characteristics. Nevertheless, to guarantee reliable sports expenditure data, future survey research should pay attention to the following points of interest.

First, preference should be given to sports-specific survey research, instead of published datasets that are used for monitoring overall national expenditure on goods and services (Davies, 2002; Downward, Dawson & Dejonghe, 2009: 105). *Second*, researchers should determine the optimal *reference period* for the expenditure question, as a trade-off exists between recall bias and infrequency of purchase. A longer reference period is favourable for the latter, while it is the other way around for shorter reference periods. *Third*, and a possible solution to the former trade-off dilemma, surveys should consider the option to differentiate between expenditure on *durables*, for which a long reference period is needed, versus expenditure on *daily consumer products* (short reference period). This method combines the advantages and disadvantages of the infrequency of purchase and recall bias. *Fourth*, researchers should exclude as many options as possible of the reasons why *zeros* appear in the data, such that ideally only 'genuine' zeros are left in the final database. *Fifth*, the inclusion of as *many expenditure categories* as possible not only provides in detailed information, but also assists the respondents in recalling their sports expenditure. *Sixth*, when analysing sports expenditure, researchers should use a zero-regression method (Tobit, Heckman, hurdle).

With respect to the latter, it is essential to stress that no 'absolute' best zero-regression method exists, as the most appropriate method depends on the theoretical reason why there are excess zeros in the data.

Still, some advice can be given about the method that should be preferred in certain specific contexts. First, it should be determined whether the zeros in the dataset are 'genuine', or whether they are non-genuine and depend on non-response or infrequency of purchase. The Heckman approach should be chosen if the zeros are non-genuine (e.g. Chapter 4), the hurdle and Tobit approach when the former is more persistent (Humphreys et al., 2010; Humphreys & Ruseski, 2015; Jones, 2000). Although we have argued that (sports-specific) datasets should try to avoid non-genuine zero's (and thus the Heckman-approach) as much as possible, certain well-designed datasets (i.e. Chapter 4) demonstrate that this is not always possible. Second, the studies in this manuscript demonstrate that spending money on sports is often a two-stage decision process, such that – when the zeros are genuine – a hurdle approach should normally be preferred above the Tobit model. Nevertheless, sometimes it is more straightforward to use the Tobit model (i) when a large number of expenditure categories are compared, (ii) when the amount of zeros is too low to calculate separate regression coefficients for the first stage decision (spending money or not), or (iii) when the hurdle model does not fit. The latter reason was often the case for the Cragg double hurdle model in the studies of this manuscript. An alternative solution is to apply the log normal hurdle model (Wooldridge, 2010), which proved to be a solid estimator (i.e. Chapter 6).

4. Policy and market implications

As already outlined in the introduction, there are three main sectors in the sports industry, namely the public, voluntary and commercial sector, that all benefit from the results of this doctoral thesis (Scheerder, 2007: 19). For the implications of the current research, we will first focus on the voluntary (sports club and sports federations) and public (government) sector. These two providers are taken together, because the sports government and the federated sports sector share the goal of raising sports participation rates. Moreover, the government aims to raise equity in the sports participation field, and subsidises the sports sector to stimulate them in erasing as much sports consumption barriers as possible. The second part elaborates on the implications of the commercial sector.

4.1. Recommendations for the government and club-organised sports sector

From an economic point of view, the sports sector is important for the government as research has demonstrated that a sports economy in a good shape contributes significantly to economic welfare (Andreff & Andreff, 2009; Gratton & Taylor, 2000: 99). Nevertheless, the main reason why government is interested in the sports sector, is because of the instrumental benefits that emanate from sports participation, and the indirect economic advantages that are associated with it (e.g. lower healthcare costs, lower absenteeism at work). To take part in sports, people have to buy certain sports goods and services, especially when engaging in a persistent way (Downward et al., 2009: 67). Therefore, government should get a thorough understanding of its citizens' sports consumption behaviour such that barriers that prevent people from spending money on sports can be removed.

A prime reason why the current manuscript calculates income elasticities instead of price elasticities is because gathering cross-sectional price data about sports goods and services to perform adequate price elasticity calculations is very difficult. For example, a race bike of €500 is cheaper than a bike of €1000, although the prime reason of this difference is probably that 'different' bikes are compared, with other qualities (weight of the bike, material, groupset, etc.). Second, parallels have been found between (interpreting) income elasticities and price elasticities. Indeed, Browning and Crossley (2000) have

empirically demonstrated that income elasticities are proportional to own price elasticities. The latter implies that that subsidies for goods/products with a high income elasticity are more effective compared to subsidies to goods/services with low income elasticities. To investigate the effect of monetary variations or stimuli on sports participation, it is therefore more straightforward to draw conclusions based on income-sports-expenditure (and income-time spent on sports) than on price-sports-expenditure (price-time spent on sports) relationships.

The results of Chapter 6 show that a 1% rise in ***income*** results in a 0.7% rise on the probability of consuming sports. Policy actions can be applied to correct for this monetary barrier (Downward et al., 2009: 128). The Flemish government for example focusses on subsidising sports infrastructure and sports clubs (supply side) to make sports participation more accessible to all income groups, and thereby to increase sports participation rates (Scheerder & Vandermeerschen, 2014: 276). Although these relative high elasticity values underline the importance of a sports subsidising policy, the results in this thesis also indicate that these subsidies could be organised more efficiently. The quest for a more efficient policy is an all-time policy issue, and given the current budgetary difficulties, this certainly is the case today. Indeed, the increased number of families in financial difficulties and the pressure on governmental sports budgets are a threat for the sports consumption figures.

Based on the elasticity results, policy suggestions can be put forward for consideration by the government. From Chapter 5 it becomes clear that the effect of an income rise is approximately twice as big for lower income-people, indicating that the government can save money and/or increase the effect of the subsidies on sports participation by rationalising their sports funding. The results thus imply that price discrimination based on income-levels would be an interesting option for consideration (see also Downward et al., 2009: 128). This could for example be achieved by stimulating sports clubs to segment the population according to their income-level, and to increase the subsidies for sports clubs that include a high proportion of low-income individuals. Another strategy is to directly donate 'sports-vouchers' – that can only be spent on sports-related services – to people who are low on income. Two points of interest should be taken into account. First, the above policy actions need to be organised without that the target group feels stigmatised. Second, one should take in mind that according to orthodox theory handing out vouchers reduces the market efficiency because of its administrative cost.

The income elasticity value of 0.938 for membership fees (Chapter 6) demonstrates that sports club membership is relatively sensitive for changes in income, and confirms the finding that lower-income people have a significantly lower chance of being a sports club member (Borgers, Seghers & Scheerder, 2015). Nevertheless, the results of this doctoral thesis demonstrate that the narrow focus on subsidising sports club membership and sports infrastructure is not the most efficient strategy in raising sports participation rates.

First, the descriptive results reveal that, in most sports activities, expenses on club membership and admission fees only make up for a small part of total sports participation expenditure. For people who are low on income, these subsidies therefore might not make a big difference, as the total cost of participation remains too high.

Second, despite the additional advantages that are associated with sports club membership compared to non-club-sports participation (e.g. not only health benefits, also social benefits), certain sports products (i.e. clothing, footwear, equipment) can be thought of as more mandatory for taking part in sports. As

the income elasticities of the former expenditure categories are comparable or even bigger than the latter (Chapter 6), it could be effective to subsidise low-income individuals and/or households directly, and to give them the option to spend this amount of money on other categories than sports club membership. This can for example be attained by the aforementioned idea of sports vouchers, or by indirectly refunding these expenses through the tax return or the national health service/insurance. The latter policy tools might be very effective, because they offer sports participants the option to spend this additional resources on the sports goods and services that they prefer (i.e. that best fit their indifference curves) (Downward et al., 2009: 132). Additionally, Lavoie (1994) shows that price changes are inferior to variations in income, especially when aggregated consumption activities (e.g. sports participation) are investigated. It is thus unlikely that people will quit sports participation because of price, as prices of specific sports goods, services and activities only define the sports activity that is chosen for, and how it is practiced. The idea of sports vouchers to reduce the overall cost of 'aggregated' sports consumption is thus probably more effective compared to price reductions for a specific expenditure category (i.e. sports club membership).

While the above strategies can be thought of as an effective policy tool for sports products, services and specific sports activities with high income elasticities, certain other sports activities are not income sensitive. Fitness, which is a popular sports activity among lower-income citizens (Borgers et al., 2015), has for example a low income elasticity (Chapter 7). Also sports participation events, walking, swimming, etc. have low income elasticities (Chapter 6/7). Given the relatively low effect that income has on consuming these products and services, a price-reducing subsidising strategy will probably not turn out to be very effective. Nevertheless, because these sports are relatively popular among social groups who are less physically active (Scheerder, Vandermeerschen, Borgers, Thibaut & Vos, 2013), they can play a prominent role in promoting sports participation in socioeconomic deprived groups. First, government can consider to focus on these sports activities by means of social marketing campaigns (Downward et al., 2009: 128). Second, the government should explore the potential of smartphone sports applications in reaching specific target groups. Innovative applications could indeed provide into information, activities and support that is tailor-made for a wide range of sports consumption segments. The regression results for example demonstrate that sports events have low income elasticities. A mass sports event application could therefore present a low-threshold (and cheap) alternative to lower income agents who experience too many barriers to engage in a sports club. While participation in sports events is often a non-persistent way of practicing sports, a smartphone application could build an online community that has similar qualities to sports club membership. Complementary, recently developed training applications could assist these event participants in customised training schemes that are far cheaper than a personal coach (see also Vos, Janssen, Goudsmit, Lauwerijssen & Brombacher, 2016). A third option is to organise instructor courses that learn how low-income citizens can be persuaded into sports, and/or to oblige (commercial) sports providers to follow a course that includes a module about full-inclusion policy.

In addition to the essential role that income plays in sports consumption, also ***other variables*** were found to influence sports expenditure. Therefore, a sole focus on income and on price-reducing strategies is not always effective, especially for higher-income people for whom the price is less of an issue.

It is for example demonstrated that having children limits adults in spending money on sports. Government could therefore stimulate innovative projects that approach the household time-budget in

an integrated way. An example is the organisation of sports activities for young children and their parents at the same time and place. Another argument for the latter is the finding that household sports expenses are positively influenced by parents who are sports active at the moment, and those who were sports active during their youth, thereby indicating that tackling sports expenditure within families could strengthen sports consumption. Sports policy actions should also take into account that sports expenditure is negatively influenced by other leisure activities. Therefore, government could focus on integrated leisure and non-leisure activities, instead of solely focussing on the separate policy domains. Examples of an integrated policy that combines physical activity with other policy domains are active commuting, cultural cycling/walking tours, etc.

Finally, government should thoughtfully consider the main reasons why they intervene in the sports consumption behaviour of their citizens. Is it for the intrinsic value of sports, or is it for the instrumental benefits that emanate from sports such as increased health, social benefits, psychic benefits, positive effects on work, etc. (Gratton & Taylor, 2000: 103; Scheerder & Vandermeerschen, 2014: 226)? The answer to the latter question could bear interesting implications on which sports activities should be subsidised and/or promoted, and which should not. In this matter, government already (partially) excludes certain activities such as fishing, traditional games, specific motorised sports, etc. Running is for example a very time-efficient activity with relative strong health benefits, although the majority of the runners do not receive any direct or indirect funding. There are other club-organised activities with higher injury rates (and lower health benefits) that are subsidised to a higher extent.

4.2. Recommendations for the commercial sector

The main purpose of commercial enterprises is to maximise profit, and a key strategy to attain this goal is by targeting specific segments of the sports market (Dixon, Backman, Backman & Norma, 2012). Because of the profit-oriented focus of the commercial sector and the many excesses that are often associated with it (e.g. environmental issues, discrimination of socially deprived groupings), a major part of the society distrusts the sports enterprises as their goals appear to conflict with the sports for all policy. Nevertheless, it is clear that the private commercial sector has contributed significantly in raising the sports participation rates (Scheerder & Vos, 2013: 32). By providing a wide variety of sports products and sports services, almost every (potential) sports participant can find the goods and services adapted to his/her specific tastes and financial resources. This variated range of products and services is complementary to the services provided by the federated sports sector. A good functioning and well-managed commercial sector is indeed one of the keystones in the maximisation of economic welfare. All the regression results of the current doctoral thesis are of particular importance for companies when setting up segment-based sports marketing strategies through social media, classic media, etc. Sports companies should be aware that they cannot satisfy everyone in the market with the same products and services, but that they should use the results to develop marketing strategies by segmentation, targeting and positioning themselves in the market (STP) (Kotler & Keller, 2005: 310).

An important implication of the current doctoral thesis is that it demonstrates that the socioeconomic and sociodemographic variables have a different influence on the decision to spend money on sports participation, and on the amount that is spent. Therefore, specific marketing strategies need to be developed to convince potential sports participants that are not yet customers, versus selling strategies for people who are already customers. Designing an email marketing campaign addressed to a customer-

database should indeed focus on different segmentation variables (and have a distinct message) than is the case for mass-media commercials aiming to turn non-sports participants into sports consumers. For example, men with a higher education spend more money on sports than women, but when looking at specific sports activities or people who already consume sports (e.g. consumer database), sex and education do not make much of a difference. Put differently, most sociodemographic and socioeconomic variables are only of interest for the decision to take part in sports, and should thus be used for this kind of marketing campaigns.

To increase turnover within the group of sports consumers, enterprises need to primarily focus on sports-specific variables. Sports participants spend more money when they take part more frequently, spend more time on it, are a sports club member, etc. Enterprises should therefore try to sell a wider range of sports products and services to sports participants. This can be achieved by applying cross-selling strategies, by promoting certain innovative and additional sports apparel (e.g. hearth rate monitors, improved footwear). Also, these enterprises could try to convince sports participants into consuming a wider diversity of sports disciplines. Race bikers can for example be interested in mountain bikes, sports holidays or even running, as the former is difficult to practice in Flanders during the winter. Our research indeed indicates that sports participants that practice more sports activities/disciplines, spend more money on sports (Chapter 5/8), and even that practicing other sports activities does not influence the amount that is spent on a specific sports activity (i.e. running, Chapter 9).

To get a full understanding of the reasons why people spend money on sports, enterprises should focus on sports-specific studies. It is mostly the behavioural and psychographic variables that influence expenditure on the specific sports running and cycling. Based on the latter categories of background variables, specific segments of sports-customers can be identified that all have specific wishes and are interested in different sports goods and services. The evidence in this doctoral thesis demonstrates that runners and cyclists not only take rational decisions regarding their sports apparel usage, but that they also express their (sports) identity through the usage of specific sports goods and clothing. By wearing certain types of sports apparel, people reveal how they think and feel about sports, and how they resemble to/differ from other sports participants (e.g. Ohl & Taks, 2007). This is for example expressed by the fact that people use more expensive sports apparel when they take part in a running event, compared to their 'regular' running activities. Other findings are that less money is spent by economic agents who run or cycle because of health reasons, or by runners who identify themselves with a running event by wearing the event-T-shirt. On the contrary, runners and cyclists who consult information regarding their sport and/or prefer certain sports-specific clothing such as tight clothing are found to be big spenders.

The studies' regression results are valuable for companies when applying STP-analysis. The results of C6 clearly indicate that higher income households spend more money on sports holidays, while other factors seem to be less important. For sports events it is the other way around as income has only little effect on the amount that is spent, while education and the age of the youngest child have a positive effect. Over the studies it also becomes clear that low income people spend less money on sports, and thus opt for less expensive sports products and services. On the contrary, C8 clearly demonstrates that identification with a sport is an important indicator of high sports expenses. Sports companies should thus try to target this group with specific sports goods and services that satisfy their needs.

5. Reflection on the limitations

The studies in this doctoral thesis have certain shortcomings. First, conceptualising sports expenditure is not straightforward and should be thought through carefully because this influences the final results. Although much attention is paid to the formulation of the expenditure questions, this does not mean that the operationalisation does not have its drawbacks. There is for example always a trade-off between the number of expenditure categories and the time that is needed to fill out the questionnaire. The current thesis opted to include as many categories as possible, although – due to practical reasons – it was not always possible to include as many categories as was the case in Chapter 10. Especially in Chapter 5 the number of expenditure categories was relatively low (i.e. seven), because the questionnaire was designed by multiple research groups, and not only investigated sports participation, but also on other non-sports leisure activities.

Second, only the studies in this thesis that focus on the overall Flemish population are representative (e.g. Chapter 4, 5, 6 and 7), in contrast to the last three chapters (Chapter 8/9/10) for which this was not possible. Therefore, one needs to consider that this non-representativeness possibly influences certain regression results. This is a point of interest, because additional analyses of the observation dataset (Chapter 9) demonstrate that dedicated sports participants have a tendency to be overrepresented in the final dataset. As a consequence, this could also be a problem in other studies that are 'representative', as mostly they only control for sociodemographic variables.

Third, it should be noted that the sports-specific analyses in Chapter 7 were based on a population-representative dataset, and that only the most popular sports activities (i.e. for which a sufficient number of respondents were available) could be included. Consequently, the only investigated team-sports are soccer, basketball and volleyball, while the duo-sports are marital arts and tennis. The major focus on individual sports activities also becomes apparent in Chapter 8, 9 and 10, as they focus on the two most practiced sports activities cycling and running. Although we believe that certain parallels will be found between the current results and expenditure on non-investigated sports activities, every sports activity benefits from sports-specific research.

Fourth, the focus in this thesis was on expenditure from a demand-side point of view. As the supply side (i.e. sports facilities) also influences sports participation and sports expenditure, future research should also include supply-variables. The only variable of supply that is included in the current thesis is 'urbanisation', a very raw proxy variable. Although little effect of this variable is found on the majority of the investigated sports activities, certain specific results (e.g. the negative effect on soccer expenditure) suggest that more detailed supply variables would probably have a more profound impact on sports expenditure. Matching geo-located data of sports participants' residence with sports infrastructure is a promising research evolution (e.g. Hoekman, Breedveld & Kraaykamp, 2016; Wicker, Hallman & Breuer, 2013), that needs to be explored in the near future.

Fifth, because the focus of the current thesis is on the money that people spend on sports, little information about the cost of sports participation was available. Therefore, as stated by Pawlowski and Breuer (2012), the data only allow for calculating the substitution effects indirectly. Although in this manuscript only small indications were found of a possible substitution effect (e.g. Chapter 5), the usage of production databases (e.g. scanner data of sporting goods retail store) can give further insight in the magnitude of this effect.

Sixth, as both the observation and diary approach have not often been applied in sports expenditure research, it was not easy to make a selection about which variables needed to be included in the data-gathering methods. More particularly, in Chapter 9 it would have been better that the survey also asked the participants about the observation-based variables. By comparing the information that was obtained by observation with the survey-responses, it would have been possible to map the methodological advantages (and drawbacks) of observation and survey methods. The same goes for diary data (Chapter 10), such that we would have been able to compare the retrospective and diary results.

Seventh, although the direction of the relation between the independent variables and sports expenditure is based on economic theory, this does not mean that this relationship is causal. In other words, it is possible that endogeneity problems arise. Although in the current research this is not really an issue, as causality is not needed for segmentation purposes, the direction of this relation could tell us more about the reasons why certain variables have an effect on sports expenditure.

Finally, the major focus in the current thesis is – apart from overall sociodemographic and socioeconomic variables – on sports-specific variables. However, there are also non-sports leisure activities that influence sports expenses, and that should therefore be explored in a more profound way.

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Appendices

Appositions

1. Policy actions that differentiate between citizens who face monetary versus time scarcity would be a more budget-efficient strategy than the current sole focus on subsidising the supply side, i.e. sports clubs and sports infrastructure.
2. Instead of radically applying the orthodox or the heterodox theory, economics would benefit from research that combines aspects of both economic approaches.
3. Pro-active and data-driven marketing of the curriculum and the relative good career perspectives (i.e. employment, income, job diversity, etc.) of masters in the kinesiology could correct for the society's distorted picture about 'physical educators', and result into rising student numbers.

Curriculum vitae

Erik Thibaut was born on the 16th of March 1986 in Zoersel. He holds a bachelor degree (KU Leuven, 2007) and a master degree (KU Leuven, 2008, Major Subject Sports Management, magna cum laude) in Physical Education and Kinesiology, and master degrees in Management (KU Leuven, 2009, cum laude) and Business Economics (KU Leuven, 2010, Major Subject Accountancy and Finance, cum laude). In 2010 he started working at the KU Leuven Policy in Sports and Physical Activity Research Group on several socioeconomic research projects regarding policy-related topics (membership figures, good governance, sports participation figures, etc.). Since 2011 he worked on his PhD about the influencing factors of the money that is spent on active sports participation. In 2012-2013 he worked part time for the Sportimonium (Olympic Sport Museum). Below a list is provided of the books and research papers that Erik Thibaut (co)authored in peer-reviewed journals.

IT (Articles in internationally reviewed academic journals)

Publications used in the thesis manuscript (Published/Accepted):

Thibaut, E., Eakins, J., Vos, S., & Scheerder, J. (2016, accepted). Time and money expenditure in sports participation. The role of income in consuming the most practiced sports activities in Flanders. *Sport Management Review*.

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